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INSTRUCTION MANUAL

for

BASIC COURSES

U. S. CITIZENS DEFENSE CORPS
OF PENNSYLVANIA

GENERAL COURSE
FIRE DEFENSE A
GAS DEFENSE A
GAS DEFENSE B
AND
NOTES ON FIRST AID

Prepared by the
Institute of Local and State Government
University of Pennsylvania

for the
STATE COUNCIL OF DEFENSE
COMMONWEALTH OF PENNSYLVANIA

March 1942

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CIVILIAN DEFENSE IS SELF DEFENSE

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Members of the sixteen corps in the United States Citizens' Defense Corps are entitled to wear the appropriate armband insignia after they have met the minimum requirements as established by the United States Office of Civilian Defense. Those requirements were our guides in preparing this manual.

It is our sincere desire that each Local Council of Defense will prepare to meet the extreme emergencies of all-out warfare which may be thrust upon the citizens of its community. Recruit members for the Citizens' Defense Corps, give them this basic instruction, train them to protect your community, and you will be discharging a most important duty to your country.

A. C. Marts
Executive Director.

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FOREWORD

The Basic Courses Instruction Manual was prepared to provide Civilian Defense School instructors in Pennsylvania with a detailed and annotated outline of courses required for membership in the United States Citizens' Defense Corps (see Appendix B). The requirements for wearing the Federal insignia of the various corps have been set up by the United States Office of Civilian Defense, and those requirements have been used as a guide in preparing this manual. Classes which satisfactorily cover the material as outlined herein will be approved by the County Directors of Civilian Defense Schools.

Two basic courses required for some of the corps are not included. Fire Defense B, Introduction to General Fire Fighting Methods, is required only for auxiliary firemen and rescue squads and is therefore taught exclusively by the organized fire instructors. First Aid, required for eleven of the sixteen corps, is being taught exclusively by instructors who are certificated or otherwise approved by the American Red Cross. The Notes on First Aid which have been included are intended only for review purposes, and are by no means a substitute for the Handbook of First Aid.

The illustrations used were reprinted from pamphlets published by the Office of Civilian Defense.

The manual was prepared by John T. Hermansen, Supervisor of Civilian Defense Training, and Charles P. Cella, Jr., both of the staff of the Institute of Local and State Government, University of Pennsylvania. Chapters were read by various members of the staff of the State Council of Defense.

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GENERAL COURSE

INTRODUCTION

A. The purpose of a local organization for civilian protection is to provide a "passive" defense against enemy air raids and to protect civilian life and property.

B. Passive defense is designed to minimize the effects of enemy bombardment.

1. Enemy objectives in air raids are:
   - a. To destroy or cripple defense production activities,
   - b. To disorganize communication and transportation, and
   - c. To break down the morale of the civilian population by creating fear and panic.
2. The enemy can be frustrated by proper organization of counter measures and training of service squads to:
   - a. Control the movements of the population during a raid,
   - b. Direct the public to maximum shelter available and instruct them in taking cover,
   - c. Repair broken mains, power and gas lines,
   - d. Reopen streets and restore communications,
   - e. Extinguish incendiary fires before conflagrations are started,
   - f. Rescue persons trapped in demolished houses and buildings,
   - g. Render prompt first aid and hospitalization to the wounded, and
   - h. Provide food and shelter for those made homeless by enemy bombardment.

C. Citizens' Defense Corps are being organized and trained to protect civilians

1. Civilian defense workers are entrusted with important responsibilities:
   - a. They must understand a multitude of duties to the point of performing them almost automatically.
   - b. They must have sound judgment and leadership in emergencies.
   - c. They must have the courage and willingness to withstand long, difficult hours of work.
2. Properly trained workers plus civilian preparedness will avert panic and widespread devastation.

General Course

Unit I—1 to 1½ Hours

CIVILIAN DEFENSE ORGANIZATION

A. United States Office of Civilian Defense

1. *Functions include planning, coordination, advice*
   - a. Initial planning and execution of programs designed to protect civilian life and property in air raid emergencies.
   - b. Promotion of activities designed to sustain national morale and to create opportunities for constructive civilian participation in the defense program.
   - c. Advice and assistance to state and local councils of defense through:
     - (1) Regional offices, which are the field offices of the OCD and from which liaison officers are assigned to the states;
     - (2) Division of State and Local cooperation, which works with state and local authorities in organization and civilian protection problems;
     - (3) Literature on training standards and requirements, organizational problems, and the subject matter of civilian defense. These publications are sent to the State Council of Defense, which in turn supplies the county and local defense councils in Pennsylvania.
2. *Regional offices coordinate and advise*
   - a. The regions of the U. S. Office of Civilian Defense are coterminous with the Army corps areas. There are nine regions, each with a regional office. Pennsylvania, Virginia, Maryland, and the District of Columbia are in the third region, with headquarters at Baltimore, Maryland.
   - b. Two liaison Army officers have been assigned from the Third Regional Office to the Pennsylvania Council of Defense to aid in civilian defense problems, particularly the planning and establishment of local control centers.

B. Pennsylvania State Council of Defense

1. *Council established by legislative act and executive proclamation*
   - a. The State Council of Defense Act of 1941 authorized the Governor to create by proclamation a State Council of Defense to coordinate State and local activities related to national and State defense.
   - b. The Governor established the State Council of Defense by proclamation on April 17, 1941.
   - c. The Council consists of:
     - (1) The Governor, who is chairman,
     - (2) The Lieutenant Governor,
     - (3) The State Treasurer,

(4) Auditor General,
(5) Secretary of Internal Affairs,
(6) Adjutant General,
(7) President pro tempore of the Senate,
(8) Speaker of the House of Representatives,
(9) A citizen appointed by the Governor,
(10) A citizen appointed by the President pro tempore of the Senate, and
(11) A citizen appointed by the Speaker of the House.

2. *Functions include coordination, research, special programs*
   - a. Cooperation with OCD and other Federal Agencies in civilian protection and such programs as physical fitness, salvage, and rationing.
   - b. Advice to and cooperation with local governments in problems of civil defense and civilian protection.
   - c. Direction of the Victory Garden and American Unity programs in the State.
   - d. Coordination of local defense activities, such as civilian protection organization and citizens' defense corps training, through eight field directors, State Air Raid and Fire Wardens, and by means of literature, and arrangements with the American Red Cross, the American Legion, the Boy Scouts of America, the automobile associations, and other cooperating agencies and organizations.

3. *State Council supervises civilian protection*
   - a. The chain of command in civilian defense extends from the U. S. Office of Civilian Defense through the State Council of Defense to the county and local defense councils. By agreement, the OCD will deal directly with the Governor and the State Council of Defense. Federal, as well as State, communications, regulations, instructions, and publications are supplied by the State Council of Defense to county defense councils which in turn transmit them to local defense councils.
   - b. For purposes of coordination, cooperation, and assistance in civilian protection, the State is divided into eight regions, each headed by a State Regional Director.
   - c. A Chief Air Raid Warden and a Fire Warden for the State have been appointed by the State Council to coordinate and supervise the air raid wardens service and auxiliary fire organization, respectively, and to act as consultants and advisors in their respective fields. The Chief Fire Warden also supervises the training of auxiliary firemen.
   - d. A Training Division has been established in the State Council to plan, advise on, and prepare instruction materials for, instruction of citizens' defense corps workers in the basic and special duty courses outlined by the U. S. OCD. The Training Division operates through the County Directors of Civilian Defense Schools.

C. LOCAL DEFENSE ORGANIZATION

1. *Councils of Defense*

a. Establishment authorized by State Council of Defense Act

(1) The State Council of Defense Act (1941 P.L. 6, Act No. 3) authorizes each political subdivision to establish a local council of defense by proclamation of the executive officer or governing body.

(2) Local councils are established to cooperate with and assist the State Council and to perform such services as the State Council requests. In so far as applicable, local councils have the same powers and duties within their jurisdictions as the State Council.

(3) More than 700 county and local defense councils have been established in Pennsylvania.

b. County defense councils are hubs of civilian protection activities.

(1) The county council of defense, headed by a chairman, is in control of defense activities in each county. All aspects of the State defense program—training, salvage, rationing, victory gardens, etc.—clear through the county defense council.

(2) In each county, there is a Chief Air Raid Warden who is appointed by and responsible to the county defense council. The air raid warden for the county advises on and supervises air raid defense activities in his county, and approves the selection of zone, sector, and post wardens.

(3) There is a Chief Fire Warden for each county under the supervision of one of the 35 Zone Fire Wardens. In the training of auxiliary firemen, County Fire Wardens are assisted by Zone Directors of Fire Training and Fire School Instructors.

(4) The County Director of Civilian Defense Schools, appointed by the county council of defense, is responsible for the basic and special duty training of citizens' defense corps workers in each county. (See Appendix B.)

(5) All publications of the United States Office of Civilian Defense and the State Council of Defense are supplied to the county councils of defense which in turn distribute them to the local councils.

c. Municipal defense councils direct local civilian defense

(1) The functions of local defense councils are varied. They include the enrollment and training of volunteer workers; participation in salvage programs; planning and conducting of community programs related to defense, such as health, recreation, and welfare programs; study of the defense aspects of such problems as housing, transportation, consumers' interests, and labor supply. Local councils are also

responsible for the line function of organizing and directing civilian protection from air raids.

(2) The organization chart (Figure 1) gives a generalized picture of local defense organization. Wide variations exist among communities in Pennsylvania. In most municipalities which have established defense councils, however, functions and organization conform in a general way to this suggested pattern.

2. *Civilian Protection Organization (See Figure 2)*

a. Citizens' defense corps protects civilians
The citizens' defense corps performs the line or action function of civilian protection in air raid emergencies. These service squads are the units operating in the field during air raids to protect civilian life and property.

b. Organization is based on existing government
The basis of civilian protection organization is the existing municipal government. Police, fire, and public works functions are usually assigned to those municipal departments. The emergency medical services may be organized under the Department of Health. Thus the emergency services, except for the Wardens Service, merely supplement or reinforce the regular peace-time municipal functions.

c. Commander directs civilian protection operations
The commander has full control over the operations of the civilian protection organization during periods of air raid emergency. The chiefs of the emergency services, Fire, Police, Wardens, Medical, Public Works, and Utilities, are subject to his direction.

d. Operations are coordinated through control center
The operations of air raid wardens and auxiliary service units are coordinated through the control center. Air raid wardens are responsible for calling the control center when there is need for the assistance of service units. The commander, with the aid of his staff and the chiefs of emergency services, dispatches the necessary units and maintains control over their distribution.

e. Sixteen units comprise Citizens' Defense Corps
Thirteen of the sixteen citizens' defense corps units provided for by OCD are organized into six emergency services: Fire, Police, Wardens, Medical, Public Works, and Utilities. In addition, staff workers, messengers, and drivers are assigned to the control center and are at the disposal of the commander.

Variations in civilian protection organization exist among Pennsylvania communities. In urban centers, a more or less complete organization is needed and is provided. In smaller communities, maintenance of all 16 corps may not be necessary; in some cases, the functions of several corps units have been or will be consolidated.

LOCAL CIVILIAN DEFENSE ORGANIZATION

Suggested by U. S. Office of Civilian Defense

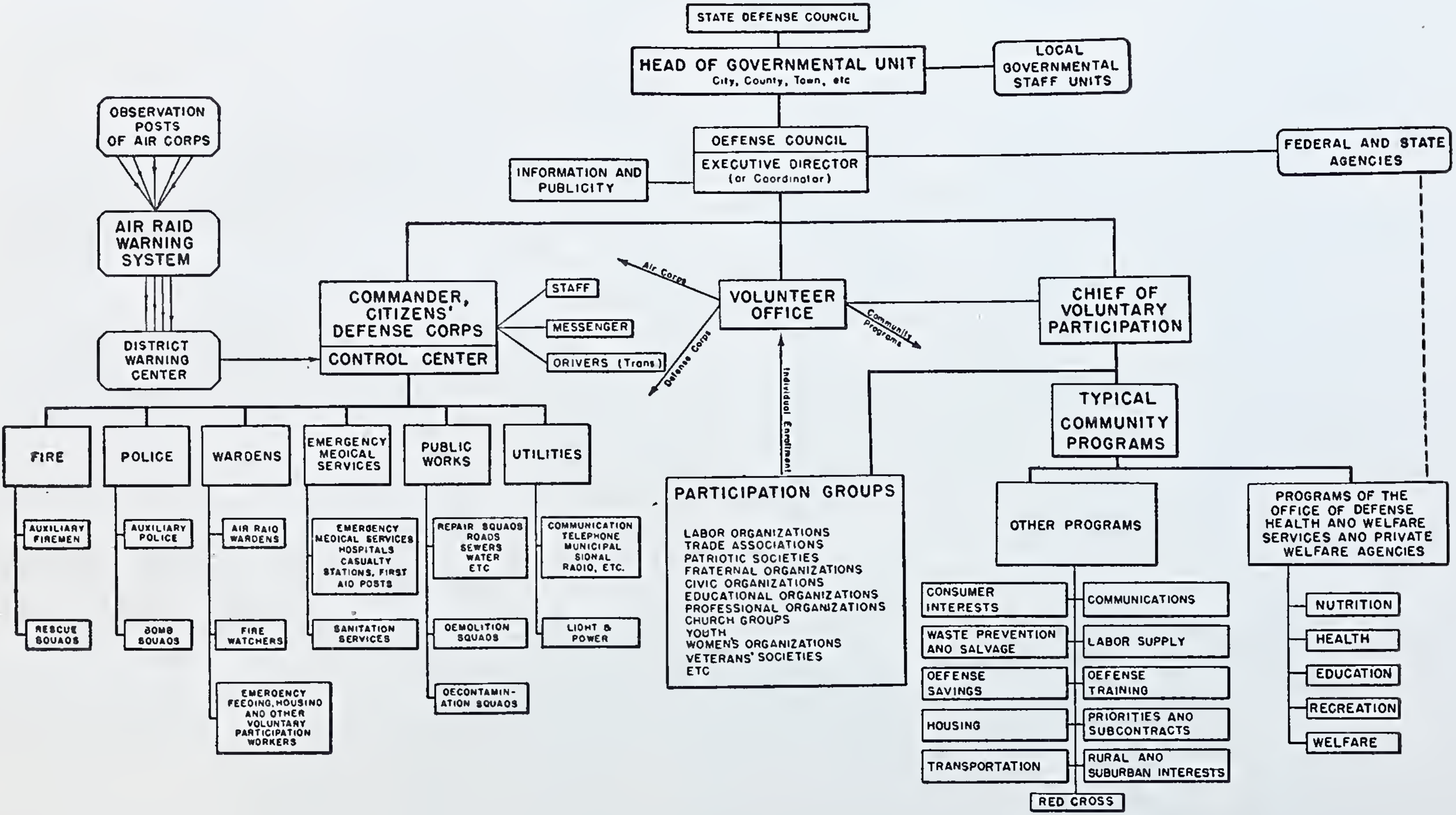
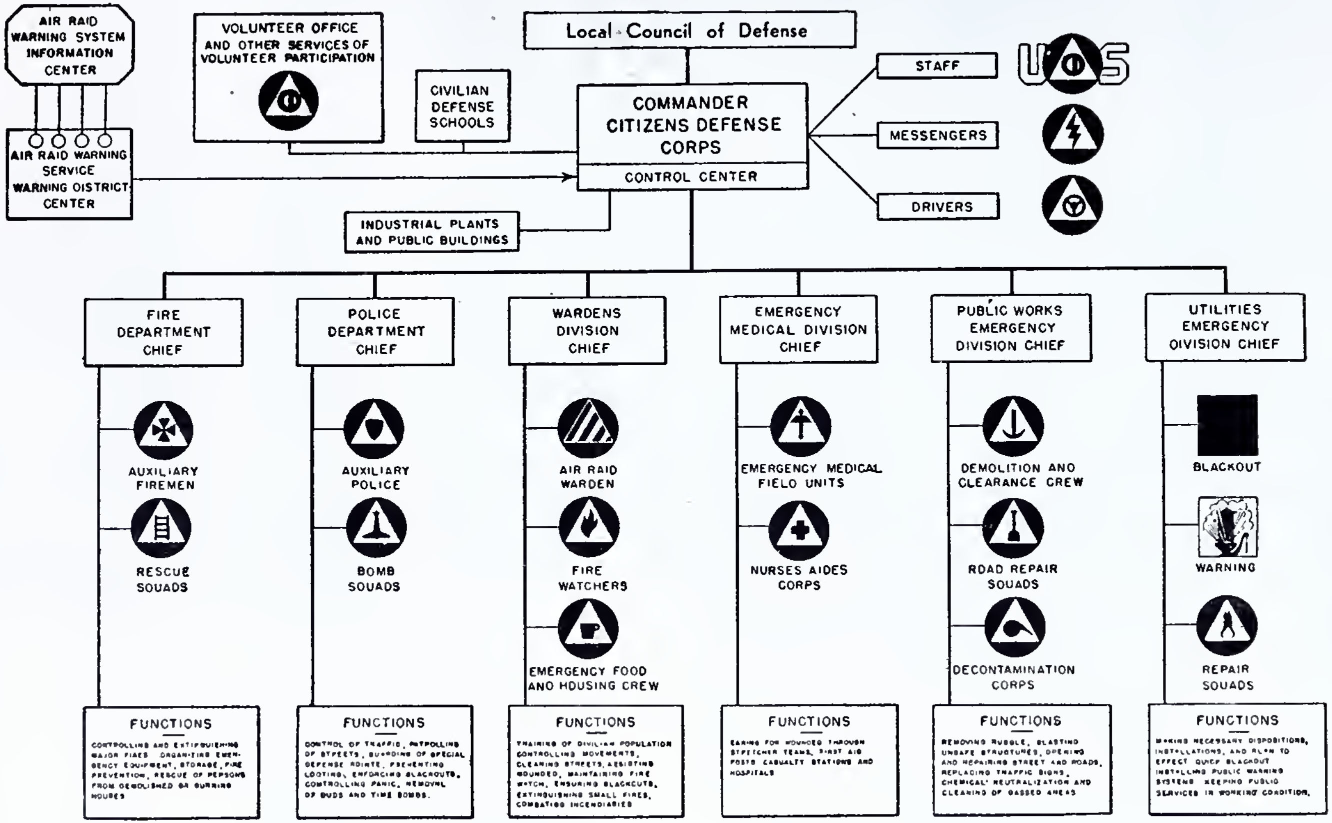


FIGURE 1

LOCAL CIVILIAN PROTECTION ORGANIZATION FOR A COUNCIL OF DEFENSE

Suggested by U. S. Office of Civilian Defense

(Citizens' Defense Corps)


AIR RAID WARNING SYSTEM INFORMATION CENTER
AIR RAID WARNING SERVICE WARNING DISTRICT CENTER
VOLUNTEER OFFICE AND OTHER SERVICES OF VOLUNTEER PARTICIPATION
CIVILIAN DEFENSE SCHOOLS
Local Council of Defense
COMMANDER CITIZENS DEFENSE CORPS
CONTROL CENTER
INDUSTRIAL PLANTS AND PUBLIC BUILDINGS
STAFF
MESSENGERS
DRIVERS
U S
FIRE DEPARTMENT CHIEF
AUXILIARY FIREMEN
RESCUE SQUADS
POLICE DEPARTMENT CHIEF
AUXILIARY POLICE
BOMB SQUADS
WARDENS DIVISION CHIEF
AIR RAID WARDEN
FIRE WATCHERS
EMERGENCY FOOD AND HOUSING CREW
EMERGENCY MEDICAL DIVISION CHIEF
EMERGENCY MEDICAL FIELD UNITS
NURSES AIDES CORPS
PUBLIC WORKS EMERGENCY DIVISION CHIEF
DEMOLITION AND CLEARANCE CREW
ROAD REPAIR SQUADS
DECONTAMINATION CORPS
UTILITIES EMERGENCY DIVISION CHIEF
BLACKOUT
WARNING
REPAIR SQUADS
FUNCTIONS

FUNCTIONS (Fire Department): CONTROLLING AND EXTINGUISHING MAJOR FIRES. ORGANIZING EMERGENCY EQUIPMENT, STORAGE, FIRE PREVENTION, RESCUE OF PERSONS FROM DEMOLISHED OR BURNING HOUSES

FUNCTIONS (Police Department): CONTROL OF TRAFFIC, PATROLLING OF STREETS, GUARDING OF SPECIAL DEFENSE POINTS, PREVENTING LOOTING, ENFORCING BLACKOUTS, CONTROLLING PANIC, REMOVAL OF DUDS AND TIME BOMBS.

FUNCTIONS (Wardens Division): TRAINING OF CIVILIAN POPULATION CONTROLLING MOVEMENTS, CLEANING STREETS, ASSISTING WOUNDED, MAINTAINING FIRE WATCH, ENSURING BLACKOUTS, EXTINGUISHING SMALL FIRES, COMBATING INCENDIARIES

FUNCTIONS (Emergency Medical Division): CARING FOR WOUNDED THROUGH STRETCHER TEAMS, FIRST AID POSTS CASUALTY STATIONS AND HOSPITALS

FUNCTIONS (Public Works Emergency Division): REMOVING RUBBLE, BLASTING UNSAFE STRUCTURES, OPENING AND REPAIRING STREET AND ROADS, REPLACING TRAFFIC SIGNS, CHEMICAL NEUTRALIZATION AND CLEANING OF GASSED AREAS

FUNCTIONS (Utilities Emergency Division): MAKING NECESSARY DISPOSITIONS, INSTALLATIONS, AND PLAN TO EFFECT QUICK BLACKOUT INSTALLING PUBLIC WARNING SYSTEMS KEEPING PUBLIC SERVICES IN WORKING CONDITION.

FIGURE 2

A complete civilian protection organization is described below.

(1) Air Raid Warden Service

  (a) Air Raid Wardens

    1. Duties

      Air raid wardens are chiefly responsible for maintaining order, assisting civilians, directing service units to points of need, advising civilians on air raid precautions and defense.

    2. Organization

      a. In each county there is a chief air raid warden appointed by and responsible to the county defense council. He is responsible for advice on and supervision of air raid wardens' operations in the county. Local councils of defense, in turn, have appointed their own chief air raid wardens.

      b. A State-wide system of zones, sectors, and posts has been organized on the basis of population. Communities are divided into zones.

      c. Each zone is headed by a zone warden. The population of a zone is approximately 50,000. Zones are subdivided into about 10 sectors.

      d. Each sector is headed by a sector warden who reports to his zone warden. Sectors have a population of about 5,000, and are subdivided into about 10 posts.

      e. Each post is staffed by a senior post warden and three or more post wardens. The post has a population of about 500. It is the operating unit during actual air raids.

  (b) Fire Watchers

    During an air raid alarm, fire watchers take up posts on roofs, and at other vantage points in order to spot and reach incendiary bombs quickly and control or extinguish them.

  (c) Emergency Food and Housing Corps

    They provide food and shelter for those whose homes have been damaged or destroyed by air raid or other disaster. They are assisted usually by private organizations equipped to render aid.

(2) Emergency Fire Service

  (a) Auxiliary Firemen

    Under the direction of officers or first-grade firemen, auxiliary firemen lay hose relays, operate small pumpers, and in other ways assist the regular firemen.

(b) Rescue Squads

These squads rescue persons trapped in debris; shut off broken gas, electric, and water lines; shore walls, tunnel through debris, and do minor demolition jobs; and render emergency first aid.

(3) Emergency Police Service

(a) Auxiliary police

Auxiliary police assist the regular police in enforcing blackouts and emergency restrictions on lighting and trespassing; guarding docks, bridges, and factories to prevent sabotage; regulating traffic to facilitate movement of essential vehicles; and preventing looting of partially demolished shops and homes. In Pennsylsylvania, a special body of Auxiliary Traffic Police is being recruited by councils of defense to assist Pennsylvania Motor Police in controlling traffic outside municipalities during blackouts.

(b) Bomb Squads

Bomb squads remove bombs which are duds or have delayed-action fuses. This work requires an unusual degree of knowledge, skill, and devotion, and is usually entrusted to picked men of the regular police force who have been carefully trained for the work.

(4) Emergency Medical Service

(a) Emergency Medical Field Units

These field units are organized by hospitals and are composed of squads of physicians, nurses, and nursing auxiliaries. Upon orders from the control center, the medical squad proceeds to the scene of disaster and sets up a casualty station, and, if necessary, a first aid post.

(b) Nurses' Aides Corps

Nurses' aides receive special training to assist nurses in wards and out-patient clinics of hospitals, public health services, and casualty stations and first aid posts manned by emergency medical field units.

(5) Emergency Public Works Service

(a) Demolition and Clearance Crews

These crews remove rubble and debris from streets, fill craters made by bombs or broken pavements, and raze unsafe walls and buildings.

(b) Road Repair Crews

These crews restore normal flow of traffic as rapidly as possible after an air raid, following up the rough clearance of the demolition crews. They smoothe road surfaces, fill holes, repave with available material and restore road markings.

(c) Decontamination Squads
After a gas attack, these squads treat clothing and equipment and chemically neutralize streets and walls contaminated by the persistent liquids known as "blister gases."

(6) Emergency Utilities Service
Utilities—Repair Squads are responsible for keeping public services in working condition by speedy repair or replacement of utilities mains and lines damaged or destroyed in air raids.

(7) Staff Group (under immediate direction of control center)
(a) Command Section
The duties of this section include both command and the more routine work of typing, maintaining records, operating switchboards, and performing general office work. The command staff is described in the section devoted to the control center.
(b) Drivers Corps
Drivers are assigned by the commander or the coordinator of transportation, if there is one, to first aid squads, casualty stations, control centers, and to other service units when required. Men and women who offer their own cars are enrolled for this work.
(c) Messengers
Messengers are assigned to warden posts, control and message centers, hospitals and first aid posts, fire stations, and police precincts; their work is doubly important when normal communications have broken down.

REFERENCES:

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Local Civilian Defense Ordinances and/or Executive Proclamations

General Course

Unit II—1½ to 2 Hours

THE CONTROL CENTER

A. Control System Gives Unified Operation

1. *Commander is supplied with picture of situation in field*

   In a civilian protection organization which is decentralized and operating throughout a municipality or area, some means is required to enable the commander to know the disposition of auxiliary service squads and all that is happening in the area under his control, so that he can wisely assign the necessary service units to points of need. The control system serves this purpose.

2. *Orders are transmitted quickly and accurately*

   All citizens' defense corps units in a control center area are subject to the commander's orders. With his staff, he manages civilian protection operations. The control system enables him to transmit his orders quickly and accurately and to coordinate the activities of all defense squads.

B. Commander Directs Civilian Protection

1. *The commander is appointed by the local or county council of defense*

2. *Main control center serves as his headquarters*

   During air raid emergencies, the commander will be stationed in the main control center from which he directs civilian protection activities with the assistance of his staff.

3. *He coordinates operations of auxiliary units*

   In all periods when his area has received a red warning, and thereafter until official word is received that hostile airplanes are no longer operating in range, the commander assumes full power to direct such operations as he deems advisable in passive defense. All citizens' defense corps units are subject to his command during emergencies and are committed according to his orders.

   His relationship with the various functional groups is depicted in Figure 3.

4. *He drills corps workers who have arm bands*

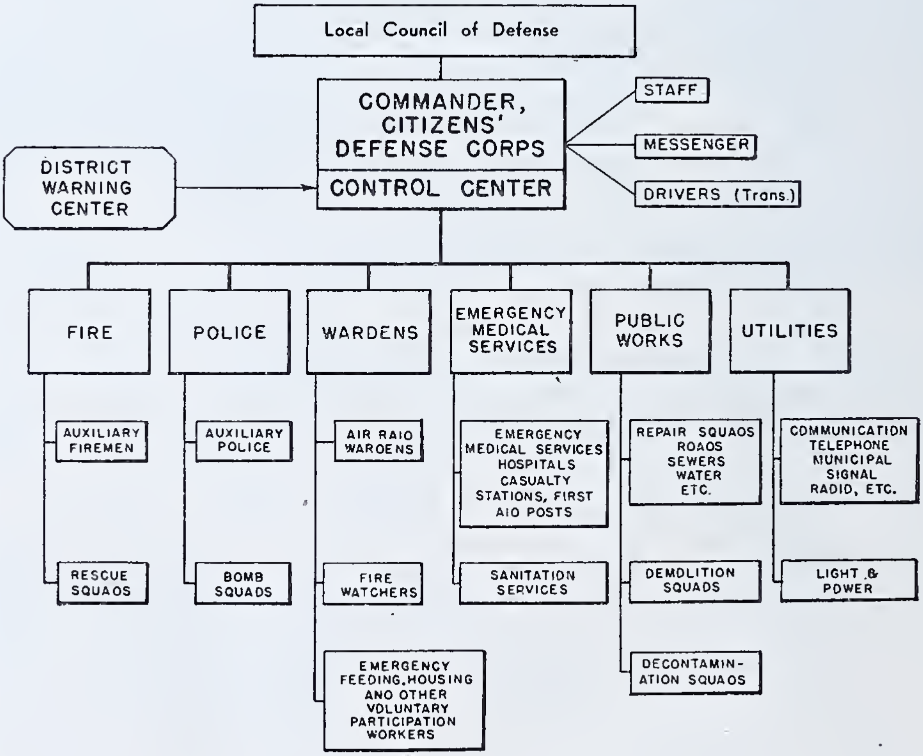
   a. Basic and special duty instruction of citizens' defense corps workers is the responsibility of the County Director of Civilian Defense Schools, under the supervision of the Training Division of the State Council of Defense.

   b. Once corps workers have completed such instruction and received their arm bands, the commander assumes responsibility for drilling them on the job for their special assignments in corps and group drills and exercises. Special duty training, which leads to the award of First Class rating, remains the responsibility of the county directors of civilian defense schools, and may proceed while the corps are getting corps drill under the direction of the commander.

C. CONTROL CENTER IS "NERVE CENTER" OF CIVILIAN PROTECTION IN ACTION

1. Air raid warning messages are received from the civil air raid district warning center.
2. Such messages are transmitted to the proper recipients.
3. Orders for sounding air raid alarms are issued.
4. Reports of air raid damage are received from air raid wardens.
5. Operating units are dispatched to incidents.

RELATIONSHIP BETWEEN THE COMMANDER AND THE FUNCTIONAL GROUPS



Local Council of Defense
COMMANDER, CITIZENS' DEFENSE CORPS
CONTROL CENTER
STAFF
MESSENGER
DRIVERS (Trans.)
DISTRICT WARNING CENTER
FIRE
POLICE
WARDENS
EMERGENCY MEDICAL SERVICES
PUBLIC WORKS
UTILITIES
AUXILIARY FIREMEN
RESCUE SQUADS
AUXILIARY POLICE
BOMB SQUADS
AIR RAID WARDENS
FIRE WATCHERS
EMERGENCY FEEDING, HOUSING AND OTHER VOLUNTARY PARTICIPATION WORKERS
EMERGENCY MEDICAL SERVICES HOSPITALS CASUALTY STATIONS, FIRST AID POSTS
SANITATION SERVICES
REPAIR SQUADS ROADS SEWERS WATER ETC.
DEMOLITION SQUADS
DECONTAMINATION SQUADS
COMMUNICATION TELEPHONE MUNICIPAL SIGNAL RADIO, ETC.
LIGHT & POWER

FIGURE 3.

D. AREA SERVED BY CONTROL CENTER DEPENDS ON LOCAL FACTORS

1. *Population*
   a. In general, one control center will serve a population of 100,000. However, wide variations properly occur.
   b. Small cities and other communities which are not located conveniently close to other cities will find it necessary to establish independent control centers to coordinate operations in their own communities. They may be located in police or fire headquarters, or other suitable building.

2. *Topography*
   Certain topographical features affect the boundaries of control center areas. For example, where a river with but one or two bridges bisects a community, it might be disastrous if the crossings were destroyed and it became impossible for action squads on one side of the river to help a severely damaged section on the other side.
3. *Political boundaries*
   Where adjoining communities have not worked out some mutual aid plan, political boundaries are a determining factor.
4. *Mutual aid plans*
   Several small cities may work out cooperative agreements among themselves or with an adjoining urban center whereby their respective services may be effectively operated from a single control center.
5. *City subdivisions*
   In large cities which require more than one control center, existing city subdivisions, such as police and fire districts, may serve as control center districts with district control centers.

E. District Control Centers Necessary In Large Urban Communities

1. In large urban centers, subordinate control centers or district centers are established in addition to the main control center, which coordinates action in the community as a whole.
2. The functions of district control centers parallel those of the main control center on a smaller scale and a lower level.
3. The main control center receives reports from the district control centers rather than from air raid wardens, and controls the movement of service squads between districts, rather than within a district.

F. Control Center Located In Safe, Convenient Place

1. *Center may be located in municipal building, police or fire headquarters, or other suitable building.*
   a. Municipal signal center of the existing police or fire services.
   b. Headquarters of municipal government, i.e. city hall or municipal building.
   c. Headquarters of volunteer fire department (in small communities).
   d. Other convenient building.
2. *Protective construction is essential*
   As the direction center of air raid defense activities in action, it is especially important that the control center be adequately protected from bomb damage. Protective considerations, such as the following, are taken into account in selecting control center accommodations.
   a. The building should not be of the type built with "load bearing" walls.
   b. The center should be located on a floor which is at least three full stories from the top of the building but not on the first floor.
   c. Basements are desirable provided that:
      (1) There is no danger of flooding;
      (2) The grade is above water, gas, and sewer mains;

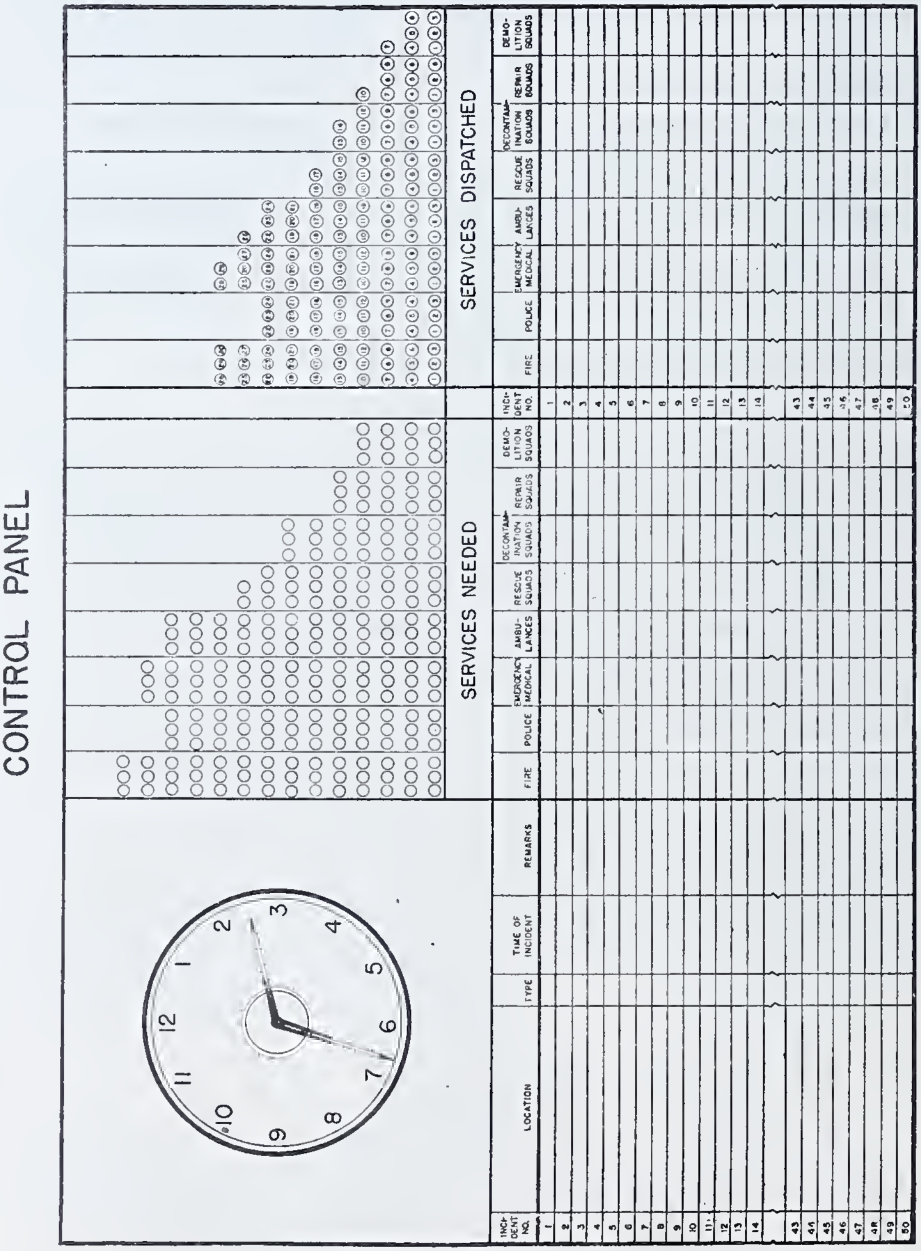

CONTROL PANEL
SERVICES NEEDED
SERVICES DISPATCHED
INCIDENT NO.
LOCATION
TYPE
TIME OF INCIDENT
REMARKS
FIRE
POLICE
EMERGENCY MEDICAL
AMBULANCES
RESCUE SQUADS
DECONTAMINATION SQUADS
REPAIR SQUADS
DEMOLITION SQUADS

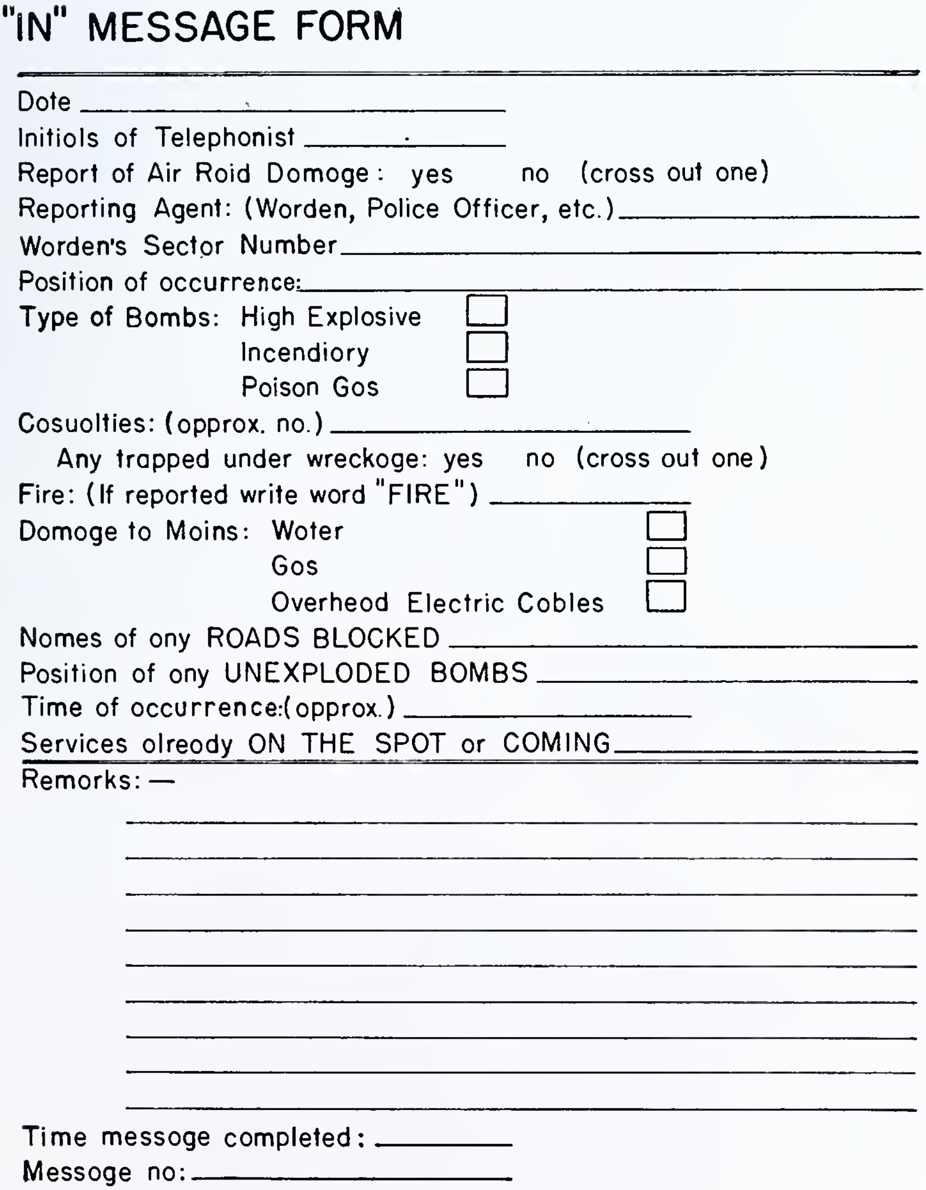
Figure 4.

(3) The ceiling supports are sufficient to bear the collapsible load of the rest of the building; and
(4) There are two exits which have direct access to the outside.

d. The building should be of fire-proof construction.

e. Arrangement should be made for blackout, gas-proofing, and protection against bomb splinters and flying glass.

f. It should be possible to control access effectively in order to prevent sabotage.



"IN" MESSAGE FORM

Date ____________
Initials of Telephonist ____________
Report of Air Raid Damage: yes no (cross out one)
Reporting Agent: (Warden, Police Officer, etc.) ____________
Warden's Sector Number ____________
Position of occurrence: ____________
Type of Bombs: High Explosive ☐
Incendiary ☐
Poison Gas ☐
Casualties: (approx. no.) ____________
Any trapped under wreckage: yes no (cross out one)
Fire: (If reported write word "FIRE") ____________
Damage to Mains: Water ☐
Gas ☐
Overhead Electric Cables ☐
Names of any ROADS BLOCKED ____________
Position of any UNEXPLODED BOMBS ____________
Time of occurrence: (approx.) ____________
Services already ON THE SPOT or COMING ____________
Remarks: —

Time message completed: ____________
Message no: ____________

FIGURE 5.

G. A Complete, Urban Control Center Is Fully Staffed

Note: Staff corps trainees in large urban centers should learn more of the details of the organization and operation of control centers. They should consult, *The Control System of the Citizen's Defense Corps, O. C. D.*

1. Assisting the commander are an executive officer; controller; and officers in charge of personnel, property, transport, billeting, inci-

OUT-MESSAGE FORM

Date: ____________________

To: ____________________

Address: ____________________

TEXT:

Time of Origin of Message: ____________________

From: (signature) ____________________

Time of Dispatch of Message ____________________

Telephonist's Initials ____________________

Message No. ____________________

Figure 6.

LOG BOOK

INCIDENT NO.	DATE	TIME	SECTOR NO.	LOCATION OF INCIDENT	TYPE OF INCIDENT	DAMAGE	CASUALTIES	SERVICES DISPATCHED (UNIT NOS.)									REMARKS
								FIRE	POLICE	EMERGENCY MEDICAL U.	AMBULANCES	RESCUE SQUADS	DECONTAMINATION SQUADS	REPAIR SQUADS	DEMOLITION SQUADS	OTHER (SPECIFY)	

LOG BOOK OF ______________________ CONTROL CENTER

FIGURE 7.

dents, communications, and plotting. Included on the staff, also, are a panel clerk, records clerk, telephonists, radio aides, and guards.

2. Chiefs of the emergency services—fire, police, wardens, medical, public works, utilities—or their deputies, assist the commander. They are responsible for mobilizing and alerting their service corps, and dispatching them according to the commander's orders.

H. CONTROL CENTER EQUIPPED WITH INTERNAL WARNING SYSTEM, MAP, CONTROL PANEL

1. Electric bell and "black box" keep staff informed.
2. Colored pins used to show various kinds of information on large master map (200 feet to the inch).
3. Control panel used to record, by means of pins, information on incidents, services needed, and services dispatched.
4. Printed forms are used for messages; warning lists are prepared; log book is permanent record of incidents.

I. EXTENSIVE COMMUNICATION SYSTEM IS NECESSARY

1. Control center must have enough telephones to make immediate contact with emergency service stations, wardens' headquarters, alarm facilities, key industries, plants, institutions, etc.
2. Alternate communication facilities are needed in case telephone service is interrupted. Amateur radio, stock ticker systems, central burglar alarm systems, local teletype networks, and similar facilities might be used in a stand-by communication system. In addition to the auxiliary messenger corps, it would be advisable to have an emergency messenger service equipped with bicycles or even horses, in some areas, to keep up communications, if other facilities fail.

J. ROOM LAYOUT DEPENDS ON SPACE AVAILABLE

1. The layout of the control center depends on available space, but conformity with the suggested layout is desirable.
2. Three rooms or divisions are needed:
   a. Waiting room for messengers, drivers, etc.
   b. Message room where communications services are centered.
   c. Control room in which are located the commander, his staff, and the chiefs of emergency services.

K. STANDARD PROCEDURES INSURE SPEED AND ACCURACY

1. *Initial reports of bombing damage*
   a. Action at incident
      Post air raid warden makes quick survey of incident and telephones his report to the control center.
   b. Receipt of initial incident reports at control center
      Telephonist at control center receives and records warden's report on an in-message form.
   c. Action in control room

(1) Messenger takes report to communications officer who numbers it and forwards it to the Plotting Officer in the control room.

(2) The Plotting Officer makes certain that the incident has not been previously reported, hands one copy to the Controller, and then, by using properly colored pin, numbered to correspond to the incident number, indicates on the control map the exact location of the incident.

(3) The Controller reads message aloud and decides services that are needed at point of incident. This decision is recorded on an out-message form which is sent to telephonist.

TYPICAL ROOM LAYOUT OF CONTROL CENTER SERVING A POPULATION OF 100,000

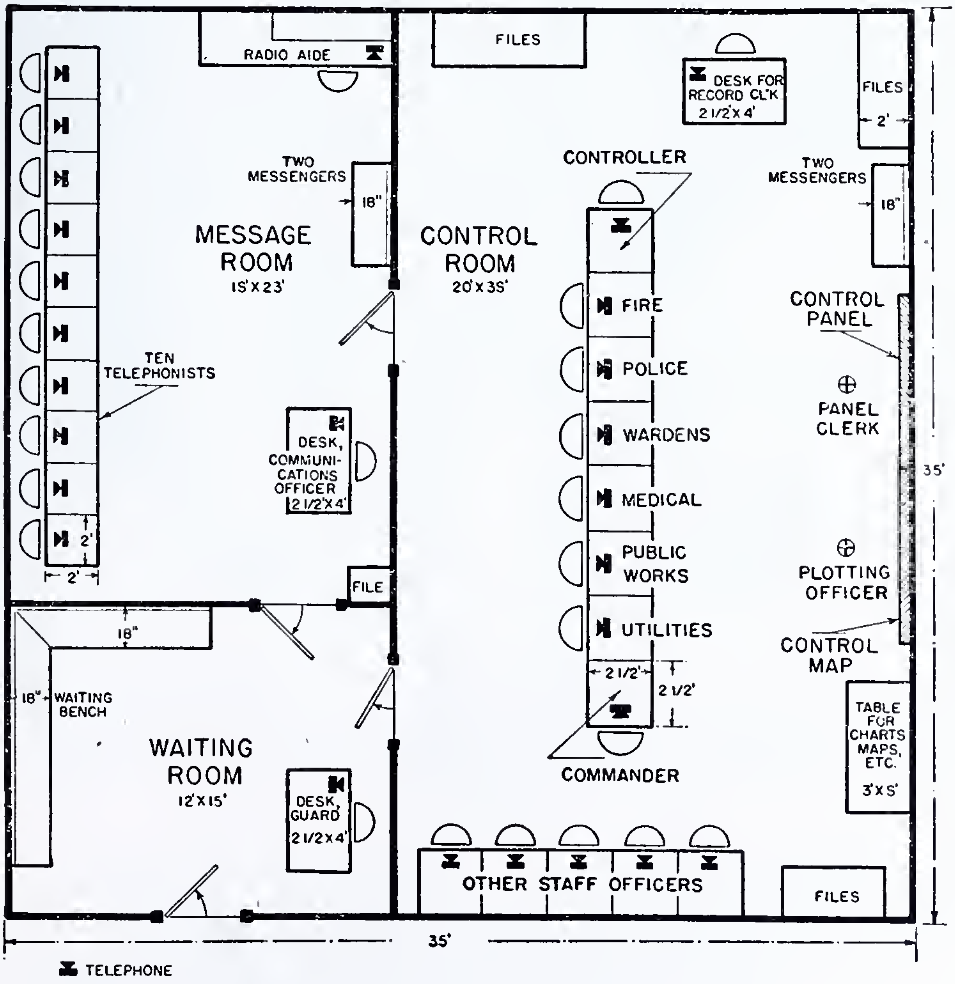
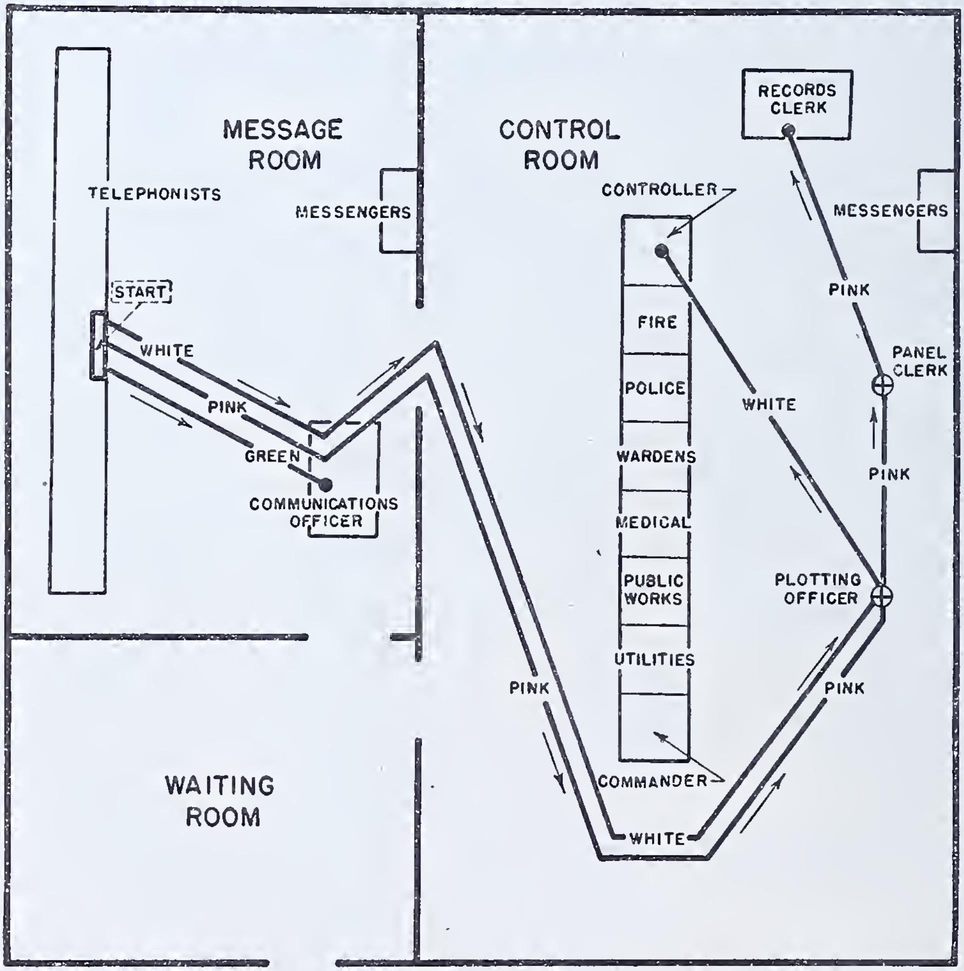


FIGURE 8.

(4) The panel clerk notes pertinent facts about incident on left side of panel and then records controller's decision by moving the appropriate pins from the space above "Services Needed" section to the proper spaces below.



FLOW OF IN MESSAGES

Figure 9.

(5) Record clerk receives all copies of report and files them.

(6) Meanwhile, chiefs of services will have decided what additional action is required. They execute out-message forms in triplicate indicating the service units to be dispatched. The out-message forms will be initialed by the controller, if he approves, and handled as above.

2. *Supplementary reports handled in same way as initial reports*
   a. Supplementary reports include all messages from a bombing incident following the initial report but not including the final report.
   b. Supplementary reports are mainly calls for assistance.

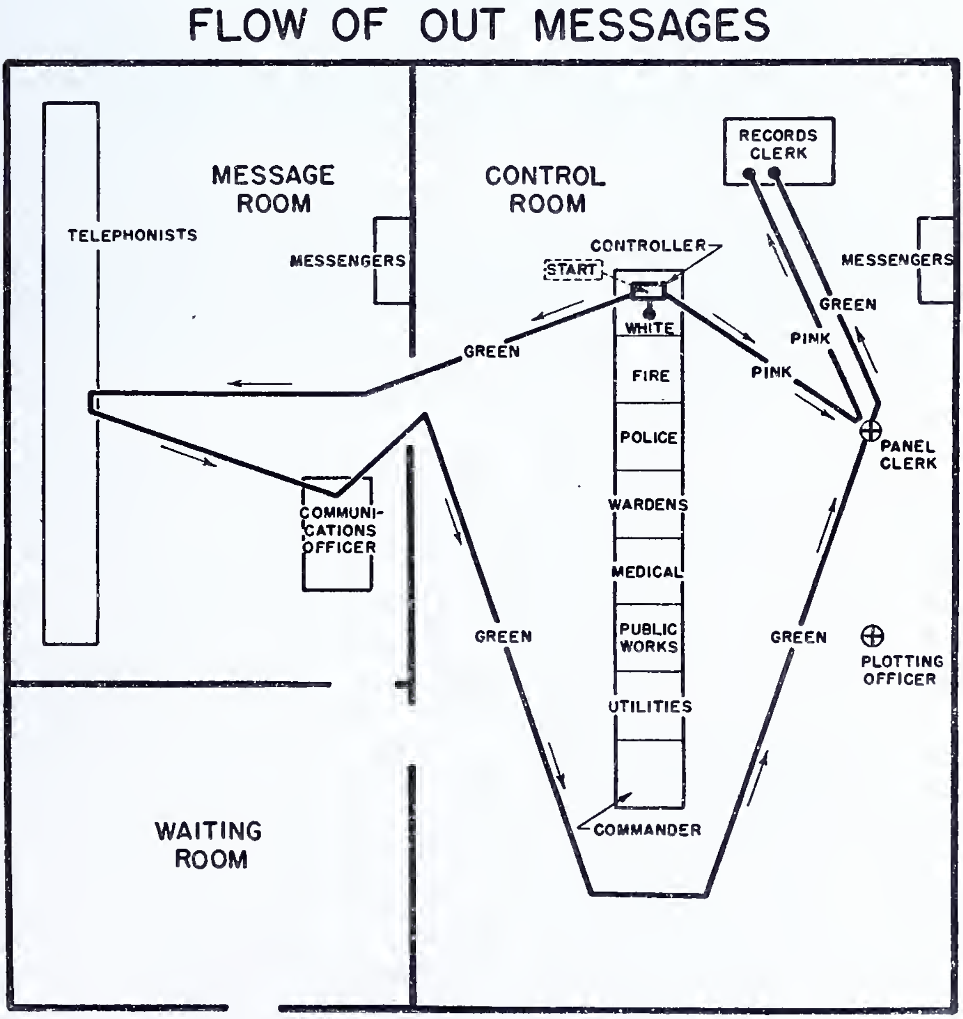


FIGURE 10.

   c. The next higher control center, if any, should be informed at frequent intervals regarding the number of service units in action in order that it may know whether reinforcements are needed or extra units are available for other control center areas.
3. *Service units report to center on return*
   a. When they return from an incident, service units report by tele-

phone to the control center and the information is recorded on an in-message form.

b. The panel clerk indicates service units' withdrawals from incidents by removing the identifying pins from the control panel.

4. *Final reports and log book record made when incident is cleared*
   a. The incident is considered closed when all service personnel and equipment have left the bombing incident.
   b. All markers are removed from the map except those showing unrepaired damage which affect subsequent civilian protection operations.
   c. Final incident reports are then placed in a permanent file and appropriate entries are made in the log book.

REFERENCES:

The Control System of the Citizens' Defense Corps, O.C.D.
Staff Manual-U. S. Citizens' Defense Corps, O.C.D.
Emergency Medical Service for Civilian Defense, Part I and Part II, O.C.D.

General Course

Unit III—1 to 1½ Hours

AIR RAID WARNING SYSTEM

A. Distinction Between Military Aircraft Warning Service and Civilian Air Raid Warning System

1. The Aircraft Warning Service has been organized by the Combat Command of the U. S. Army Air Forces for detecting and reporting the presence of enemy airplanes,
   a. to enable our fighting planes to locate and attack hostile raiders, and
   b. to enable the military authorities to warn communities in the path of invading bombers to actuate their local air raid protection systems.
2. The Civilan Air Raid Warning System is organized to give warning by messages and signals of the approach of enemy aircraft so each locality in the path of enemy bombers can mobilize its civilian protection resources by means of its public warning system.

B. The Military Aircraft Warning Service*

1. *Service is organized by regions*
   a. For purposes of air defense, continental United States is divided into four interceptor command areas, each under one of the four air forces as follows:
      (1) First Air Force—northeast area
      (2) Second Air Force—northwest area
      (3) Third Air Force—southeast area
      (4) Fourth Air Force—southwest area
      Pennsylvania is in the northeast area which has its headquarters at Mitchell Field, New York.
   b. Each interceptor command area is in turn divided into a number of air defense regions. These regions are coterminous with the army corps areas. The Third Army Corps Area consists of Pennsylvania, Maryland, Virginia, and the District of Columbia, and has its headquarters at Baltimore. The command post of an air defense region is known as an information center.
   c. Each air defense region is subdivided into two or three smaller areas, each with a central communications point known as a filter center.
   d. Each filter center area is further subdivided into smaller areas, approximately 36 square miles in size, in each of which is located an observation post manned by civilian observers.

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* The Aircraft Warning Service is administered by the U. S. Army, and details regarding its organization and operation must be released by the Army.

2. *American Legion responsible for manning observation posts in Pennsylvania*

   In Pennsylvania, prior to the establishment of the State Council of Defense, the 1st Interceptor Command requested the American Legion to man the 1200 observation posts in the State. In May 1941, the State Council of Defense approved this arrangement between the 1st Interceptor Command and the American Legion. In furtherance of this responsibility, the American Legion, at its own expense, has to date manned 831 of these posts.

3. *Air raid information is relayed*

   a. When the observer on duty at an observation post hears or sees an enemy plane, he immediately telephones to the filter center a report of the height, speed, direction, type, and number of enemy planes.
   b. A plotter at the filter center puts an appropriate marker on a map of the filter center area.
   c. An expert Army officer (filter officer) at the filter center evaluates the information received from various observation posts and decides the most probable height, speed, direction, type, and number of planes in the enemy raid, and indicates his decision by placing a particular kind of marker on the map.
   d. A teller, watching the map from a balcony, telephones to the regional information center the data shown by the filter officer's marker.
   e. A plotter at the information center, on receiving reports of the raid from the filter center, indicates this information on an operations map which includes all the filter areas in the air defense region.
   f. On a balcony overlooking the operations map at the information center (in some cases, the filter center) is a civil air raid precaution officer who watches the course of enemy planes. By means of the Civil Air Raid Warning System he transmits the warning to the district warning centers in the various civil air raid warning districts, from which it is disseminated to the control centers of the various communities in the path of invading bombers.
   g. The "black box" is the crossroads of the spheres of activity of the Army and councils of defense. The Army's responsibility ends when the warning is received at the black box. From that point on the councils of defense assume the responsibility, and the expense, of distributing the warnings.

4. *Message procedure designed to disseminate information rapidly*

   a. Air raid warning messages originate in the operations room of the information center or the filter center where all information regarding the movement of hostile airplanes over the region is received and evaluated.

b. The air raid precaution officer transmits the warning to the proper warning district centers in sufficient time to allow its dissemination to the lowest using agency prior to the arrival of hostile aircraft over the warning district.

c. In each district warning center there is a "key telephone" set with four keys—colored yellow, blue, red, and white. These keys are associated with four small electric light bulbs, one for each of the four types of messages. This device is called the "warning box." Upon receipt of a warning, a bell rings and the appropriate bulb is lighted.

d. The types of air raid warning messages which are transmitted to the control centers and other civilian agencies are as follows:

  (1) Yellow—Preliminary Caution
  This warnng alerts the whole United States Citizens' Defense Corps. It is also telephoned to a predetermined list of certain industries, utilities, etc. which have been allowed special lights under blackout rules. This warning alerts them to get ready to obscure their special lights when a Blue or Red warning is received. It is confidential and is limited to the use of the district warning center.

  (2) Blue—Lights Warning
  This warning is issued by telephone to essential industry and transportation. It means that raiders are expected to pass over that area. It serves to notify industry and transportation that they must obscure their special lights at once. If, as may happen, a Red warning is given without a prior Blue warning, the special lights must be obscured at once. This warning is confidential and is limited to the use of the district warning center.

  (3) Red—Action Warning
  This message, upon which a public warning is given, is issued by all planned means of communication. It means that an air raid may occur in five minutes and that immediate action in regard to air raid precautions must be taken.

  (4) White—Raiders Passed
  This warning means that the hostile planes have left the area or the threat of a raid is no longer imminent. A public signal should be given on this warning only if the Red warning is still in force. This message serves to notify industry and transportation that they may resume the use of the special lights allowed them under provisions for the "alert." If, as may happen, the recipient has received no previous warning, no action is required.

C. THE CIVILIAN AIR RAID WARNING SYSTEM

1. *System is organized by districts*

  a. Air defense regions
  The United States has been divided into air defense regions, each of which is subdivided into warning districts.

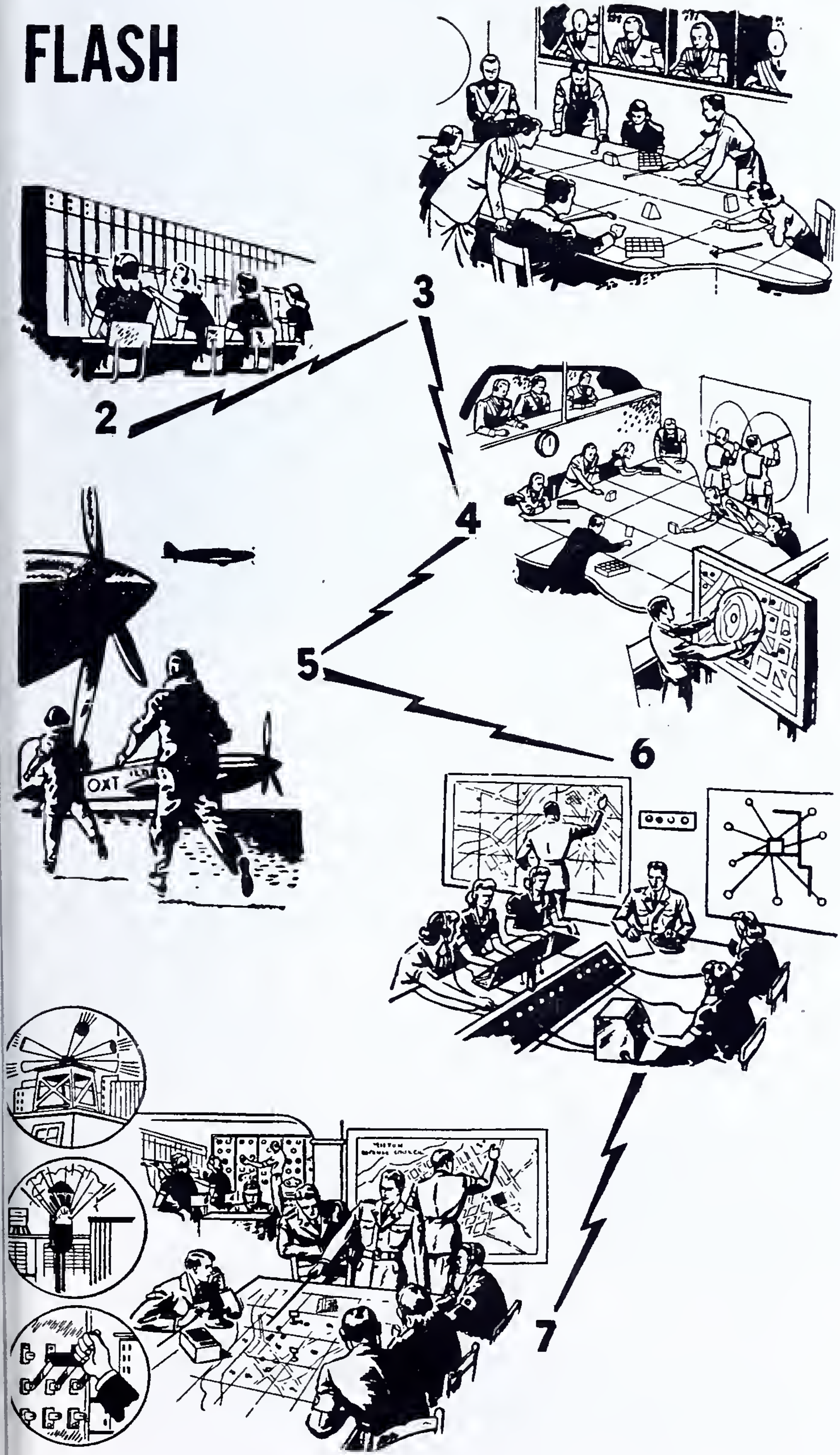
When an observer sights a group of hostile planes, he picks up his telephone (1) and says *Army Flash*. The Central Operator (2) at once connects him with the assigned Filter Center (3) to which he reports the type of planes, number, height, and direction of flight. When several reports agree, watchers transmit the data to an Information Center (4) where developments over a large area are plotted on a huge map.

Watching the map, Air Corps officers order interceptor planes into the air, (5) direct them to contact with the enemy; another officer notes the cities threatened and flashes a yellow, blue, or red alarm, according to the degree of danger, to the proper Warning District Center (6).

At this point, Civilian Defense takes over from the Air Corps, telephones the warnings to Control Center (7) within the Warning District. And here the Commander of the local Citizens' Defense Corps orders the alert, has the public warning sounded usually short blasts on air horns, power horns or steam whistles or on the wailing sirens—and if the bombers arrive overhead, directs the operation of passive defense. Learn the air raid warning for your city.

Figure 11.

FLASH



b. Warning districts

    (1) The warning district is the unit of the Civilian Air Raid Warning System.

    (2) Air raid warning officers dispatch messages from the district warning center to control centers and others on warning lists.

    (3) Boundaries of warning districts and the locations of district warning centers are fixed by the State Council of Defense in cooperation with the commanding officer of the 1st Interceptor Command.

    (4) Warning districts are confined to relatively small areas in order to restrict warning messages to a threatened area, thus avoiding unnecessary spread of anxiety and dislocation of normal activity.

    (5) Warnings will always apply to the whole of a warning district and to that district only. Messages transmitted to any district must not become known to persons in another district. Messages will be dispatched to warning districts, one at a time, as each district becomes threatened by the progress of a raid.

    (6) Pennsylvania has been zoned into 57 warning districts.

2. *Principal features should be learned*

    a. Ordinarily air raid warning messages will originate in only one place in each air defense region: the information center (one in Pennsylvania). However, when time does not permit transmission of warnings to the information center prior to civilian warning, filter centers (four in Pennsylvania) will issue warnings to district warning centers. All 57 district warning centers in Pennsylvania are now manned 24 hours a day. Frequent tests to check the time required to fan out the warnings show steady improvement.

    b. Regular telephone communications systems will be used to transmit calls from the information centers to the warning districts, which in turn notify the individual recipients on carefully prepared warning lists.

    c. Warning lists will be maintained by certain specified telephone exchanges, warning district centers and civilian air raid control centers of those officials and establishments designated to receive air raid warning messages. Compilation of warning lists is the responsibility of the County Council of Defense and the County Chief Air Raid Warden.

3. *Messages are transmitted to selected persons and agencies by several means*

    a. Messages received in a district warning center are relayed to all persons and places on the warning lists. The method by which messages are transmitted depends upon various conditions in each locality. Warning messages may be transmitted:

AIR RAID WARNING SIGNALS

COLOR	NAME OF MESSAGE	TEXT OF MESSAGE PASSED BY TELEPHONE	DISTRIBUTION AND MEANING	SIGNAL
YELLOW	PRELIMINARY CAUTION	"AIR RAID MESSAGE - YELLOW"	CONFIDENTIAL - TO LIMITED NUMBER OF RECIPIENTS WHO TAKE PRECAUTIONARY AND UNOBTRUSIVE MEASURES TO BE READY TO ACT INSTANTLY THE ACTION WARNING IS RECEIVED.	TELEPHONE CALL ONLY
BLUE	2ND STAGE OF CAUTION	"AIR RAID MESSAGE - BLUE	CONFIDENTIAL - TO LIMITED NUMBER OF RECIPIENTS SAME AS ABOVE AND AS A "LIGHTS WARNING."	TELEPHONE CALL ONLY
RED	ACTION WARNING	"AIR RAID WARNING - RED"	PUBLIC WARNING – MEANING THAT AN AIR RAID MAY OCCUR WITHIN A SHORT TIME.	TELEPHONE CALL PLUS PUBLIC AIR RAID WARNING INSTRUMENT.
WHITE	ALL CLEAR	AIR RAID MESSAGE - WHITE"	CIRCUMSTANCES NECESSITATING THE PRELIMINARY CAUTION NOW PASSED. ALSO, IF OTHER WARNINGS HAVE BEEN SENT THIS INDICATES "ALL CLEAR".	TELEPHONE CALL. PUBLIC WARNING ALSO IF "RED" IS STILL IN FORCE.

FIGURE 12.

- (1) By district warning center personnel
    - (a) Warning lists must be kept in an appropriate location within ready access of the air raid warning officer who receives the messages.
    - (b) After receipt of a message, the air raid warning officer distributes the prepared warning lists to those who have been designated to assist in transmitting messages.
    - (c) Each person who assists in transmitting messages should not distribute a particular message to more than ten recipients.
    - (d) When all persons on a list have been called, the time of dispatch and the initials of the person who transmitted the messages should be noted.
    - (e) Standard prepared forms are used for warning lists. Such forms are made up in colors corresponding to the type of warning message, i.e. yellow, blue, red. Spaces are provided for telephone exchange and number, name of recipient, date and time, and notation as to completion of the call. (See Figure 13.)
- (2) By telephone company central office operators
    - (a) Authorization of such operators to transmit messages is by the air raid warning officer in the district warning center.
    - (b) The transmission is initiated by the telephone company operator immediately upon verification of the air raid warning message by the information center operator.
    - (c) Central office operators designated to transmit air raid warnings are supplied with the standard prepared forms for recording calls.
- (3) Through special conference equipment

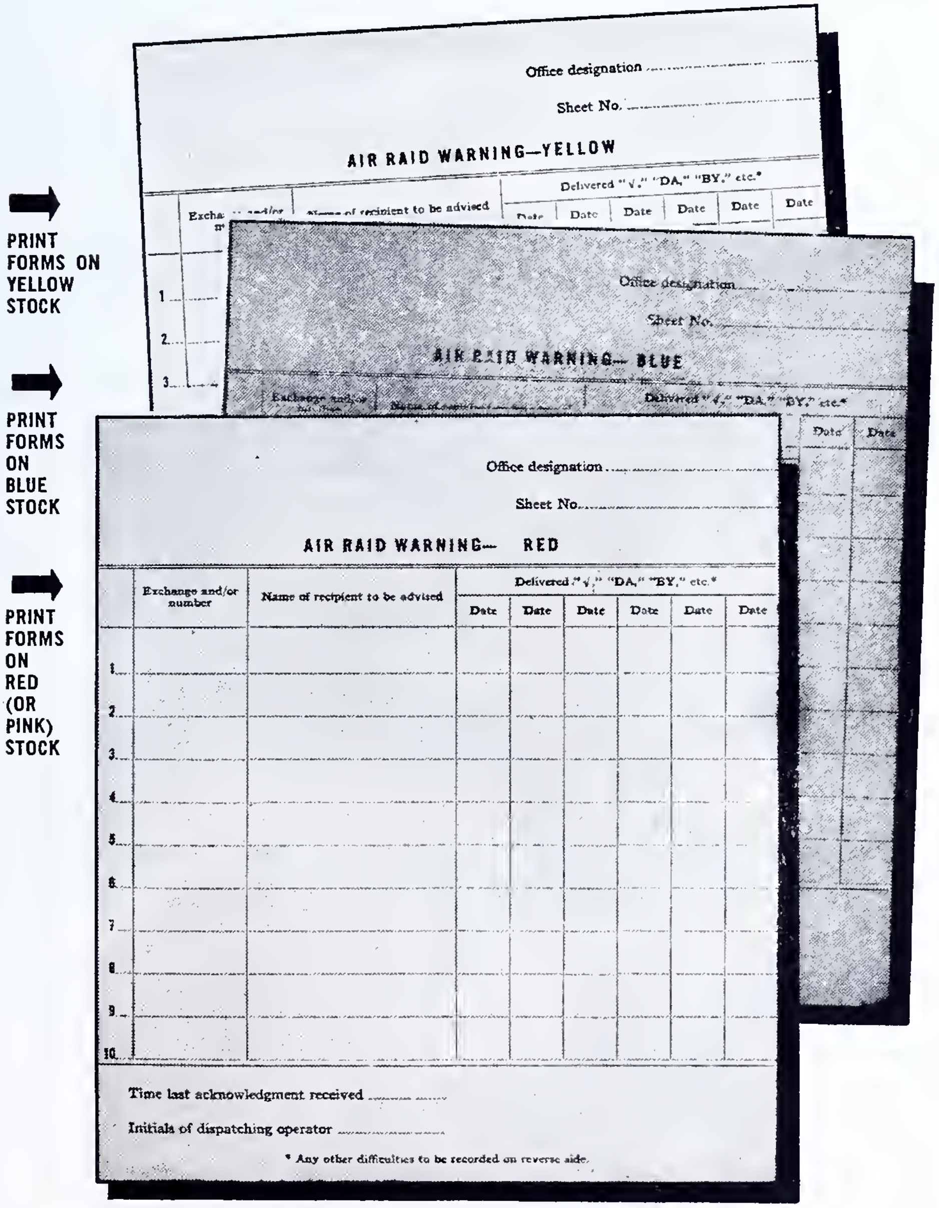
  Special "conference equipment" may be necessary to permit a group of as many as ten people to be called simultaneously and thus increase the number of recipients who may be called by a single person. This special equipment is particularly useful where the number of recipients is exceptionally large, and where it is vital to have the least possible delay in transmitting messages to strategic points.

b. Standard warning message forms are used (See Figure 13)

- (1) One date column should be used for each warning fanned out.
- (2) Exchanges or recipients are called in the order listed. They should be listed in order of priority.
- (3) No attempt is made to call a recipient by any number other than that listed on the form.
- (4) If no answer is received within 15 seconds, "DA" (Doesn't Answer) is entered in the appropriate date column and the next recipient is called.
- (5) On receipt of a satisfactory acknowledgment, a check is made in the appropriate date column.

(6) On dial systems, the 15-second ringing period should be checked by counting 3 complete ringing tone cycles.

(7) If the line is busy, a "BY" (Busy) is entered in the appropriate date column and the next recipient called.



PRINT FORMS ON YELLOW STOCK

PRINT FORMS ON BLUE STOCK

PRINT FORMS ON RED (OR PINK) STOCK

Office designation ....

Sheet No. ....

AIR RAID WARNING—YELLOW

Delivered "√," "DA," "BY," etc.*

Date | Date | Date | Date | Date | Date

1 ......

2 ......

3 ......

Office designation ....

Sheet No. ....

AIR RAID WARNING— BLUE

Delivered "√," "DA," "BY," etc.*

Date | Date

Office designation ....

Sheet No. ....

AIR RAID WARNING— RED

	Exchange and/or number	Name of recipient to be advised	Delivered "√," "DA," "BY," etc.*					
			Date	Date	Date	Date	Date	Date
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Time last acknowledgment received ....

Initials of dispatching operator ....

* Any other difficulties to be recorded on reverse side.

FIGURE 13.

(8) If the recipient's phone does not ring, the number is redialed at once. Only two attempts are made to obtain any recipient.

(9) If there is no reply, the air raid warning officer at the district warning center should take the necessary steps to see that the telephone is manned thereafter.

(10) If the recipient's phone does not ring, or there is indication of trouble with the line, the air raid warning officer should immediately call the operator, attempt to obtain connection through her, and, in addition, report the trouble previously encountered.

(11) When the last recipient on the list has been called, the attendant makes a second attempt to reach those marked "DA" or "BY".

4. *Warning lists are prepared in advance*
   - a. The compilation of warning lists is a responsibility of the County Councils of Defense and the County Chief Air Raid Wardens. These lists must be continuously revised.
   - b. The names and telephone numbers of persons to receive warning messages in each warning district are recorded on warning lists. Since the recipients will not be the same for the various warning signals, there will be three lists for each district: one for preliminary caution, one for lights warning, and one for action warning. Some names will appear on all three lists.
   - c. Strict control must be exercised over the selection of the persons on warning lists.
   - d. Those included on the warning lists must comply with the following conditions:
     - (1) Telephones must be manned continuously day and night and must be answered promptly.
     - (2) Air raid messages must not be passed on to persons in other warning districts.
     - (3) Recipients of the preliminary "yellow" or "blue" warning are to take necessary preparatory steps, but otherwise to keep the warning secret. Factories which are given the preliminary caution are not to warn employes by signals which can be heard outside.
   - e. Figure 14 is a list of recipients of warning messages and normal warning priorities which were suggested by OCD.

D. PUBLIC WARNING SYSTEMS

1. *Air raid warning system needed in each community*
   - a. There are three classes of warning instruments:
     - (1) Steam sirens and whistles.
     - (2) Compressed-air or rotary sirens.
     - (3) Self-generating sirens.
   - b. Type of warning system depends on type of community
     - (1) In rural areas, a complete system of public signals may be impracticable. Air raid information can be transmitted by telephone to the local police who can then warn the citizenry, perhaps by hand-operated sirens.

AIR RAID WARNING RECIPIENTS AND ORDER OF WARNING

Recipient	Preliminary Caution (Yellow)	Priority	Lights Warning (Blue)	Priority	Action Warning (Red)	Priority
1. Local civilian defense authorities	yes	1	yes	1	yes	1
2. Local civilian government officials	yes		yes	3	yes	
3. Operators of public warning signals	no		no		yes	1
4. Fire stations	yes	2	yes	3	yes	3
5. Police stations	yes	1	yes	1	yes	1
6. First-aid stations	yes	4	yes	5	yes*	4
7. Decontamination squads	no		no		yes*	4
8. Hospitals, all types	no		yes		yes*	4
9. Public utilities:						
a. Railroads	yes		yes		yes	
b. Dock facilities	yes	2	yes	3	yes	2
c. Electricity generating plants	yes	3	yes	2	yes	3
d. Gas works	yes	3	yes	4	yes	3
e. Water works, pumping stations.	no		yes		yes*	4
f. Communication facilities	yes	2	yes	2	yes	2
g. Oil refineries and storage plants	yes	4	yes	5	yes*	3
h. Defense works dealing with high explosives, inflammable or toxic materials	yes	2	yes	3	yes	3
i. Blast furnaces or similar establishments	yes	2	yes	2	yes	3
j. Factories of national importance or those employing more than 500 persons	no		yes		yes*	5
k. Schools	(see note)	2	(see note)	4	yes*	2

(Note.—In places where the local government has not provided ample shelter near the school, preliminary warning should be given.)

*Only if not within earshot of a public signal.

FIGURE 14.

(2) Industrial establishments located in small communities can warn the citizenry of the community with the same warning signal provided to warn employees of the plant.

(3) In industrial areas

- (a) Where public warning signals are to be provided, use of existing sirens and whistles for other than air raid warning purposes should be discontinued.
- (b) Satisfactory whistles and sirens should be incorporated in the air raid warning system. The areas not effectively covered should then be covered by additional air raid warning sirens.
- (c) Factory whistles not included in the layout of public warning signals might be blown after the official public signals have been sounded.

    (d) Where a considerable area has to be covered, the minimum number of large signaling devices is preferable to a large number of small devices. The number of points to which orders for sounding warnings have to be transmitted should be kept to a minimum.

c. Standard codes are used for signals

Whatever public warning system is used, the codes used are as follows:

- (1) For air raid warning (Red)

  Signal of two minutes' duration consisting of:
  - (a) If sirens are used: a fluctuating or warbling signal, each fluctuation cycle to extend over a period of three to eight seconds, or
  - (b) If air horns are used: a succession of intermittent blasts of about five seconds' duration, separated by silent periods of about three seconds.
- (2) For all-clear signal (White)
  - (a) If sirens are used: a continuous signal of two minutes' duration at a steady pitch, or
  - (b) If air horns are used: A long blast if this be possible; if not, then as long a blast as is within the capacity of the instrument, repeated at 20-second intervals for a two-minute period.

2. *Municipal signaling systems checked*

Police and fire alarm systems are as important in air raid precautions as public air raid warning systems. They should be checked for adequacy and protected against damage and sabotage. Receiving messages, locating emergency calls, and properly dispatching protection forces depend upon the proper functioning of the police and fire communication system.

References:

Air Raid Warning System, OCD
The Control System of the Citizens' Defense Corps, OCD
Municipal Signaling System, OCD
Volunteer Aircraft Spotters, Bulletin No. 11, Pennsylvania State Council of Defense

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General Course

Unit IV—1½ to 2 Hours

BLACKOUTS

A. A BLACKOUT IS A PASSIVE DEFENSE ACTION. Lights are extinguished, or effectively screened, to deprive enemy night bombers of reference points to their objectives.

B. BLACKOUTS MINIMIZE AIR RAID DAMAGE

1. *The principle aims of enemy air raids are to cripple defense production and to disorganize communication and transportation by destroying*
   - a. Military positions, air fields, and bases.
   - b. Industries essential for wartime production.
   - c. Municipal utilities and transport facilities.
   - d. Stores of civilian food supplies and material.
   - e. Civilian population centers.
2. *Blackouts do not conceal the location of cities*
   - a. On clear nights, when there is moonlight or starlight, there is sufficient light for effective bombing.
   - b. Cities located on rivers, or at the confluence of two rivers, are especially easy to locate because of light reflections on the water.
   - c. Flares and incendiary bombs may be dropped by enemy planes to disclose specific and area targets.
3. *Blackouts do conceal the pattern of streets and centers of activity*
   - a. They prevent identification of the locality as a guide to other points more distant.
   - b. They prevent use of lighted streets or areas as reference points for attacks on specific objectives within the immediate area.
   - c. They prevent haphazard bombardment because of inability to locate assigned targets.

C. NEED FOR PRECAUTIONS VARIES ACCORDING TO TYPE OF COMMUNITY

Every city or town within reach of enemy bombers is vulnerable to bomb attacks. If a bomber is unable to locate its assigned target due to a blackout, it will drop its bombs on some community which can be located. Every such community, no matter how small, must be ready to enforce blackout measures for its own protection, if for no other reason.

1. In urban and industrial communities more elaborate blackout procedures are required.
2. In rural areas and isolated communities simple precautions are sufficient.
3. In small communities located in metropolitan areas, blackout regulations must conform closely to those enforced in the central urban area.

4. All-night, every-night blackouts over the whole vast area of the United States will probably never be required. Areas within 300 to 600 miles of the seacoast, however, because of their vulnerability, will probably be required to blackout every night if there is an immediate danger of air raids.
5. Blackout area limits will probably follow strategic and industrial boundaries, rather than State, county, city, or other political boundaries.
6. Manufacturing and industrial centers should be considered as separate areas. If such areas are subdivided according to political boundaries, the agencies responsible for blackout control of the various sub-divisions must be highly coordinated.

D. ARMY AND CIVIL AUTHORITIES ARE RESPONSIBLE FOR BLACKOUTS

1. *Army decides blackout policy*
    - a. Blackouts are an integral part of military air defense against enemy raids. Hence, primary responsibility for blackout policy rests with the U. S. Army. Decisions on such matters as the need, extent and scope of blackouts, special lighting restrictions for essential industries, required blackout actions by civil authorities during alerts, will be made by the Army.
    - b. Orders for alerts and blackouts will be sent by the Commanding Officer, 1st Interceptor Command, to civil authorities and industries through the Aircraft Warning Service.
    - c. In preparing coordinated plans for air defense, military and civilian defense authorities will be governed by two cardinal points:
        - (1) If a total blackout would be of no value and is not required, only such blackout as is effective and needed should be enforced; and
        - (2) Whatever blackout regulations are prescribed should, in all cases, be enforced without laxity or exception of any kind.
2. *Civil authorities are responsible for blackout execution*
    - a. Responsibility for execution and enforcement of blackouts rests with civil government.
    - b. Statutory regulations have been or will be enacted by the State, counties, and municipalities governing blackouts. These set forth the responsibilities of various agencies and require compliance under penalty.
    - c. The air raid wardens, police, and auxiliary police will enforce the provisions of blackout regulations and instructions.

E. ADVANCE PREPARATION IS FIRST PRINCIPLE IN BLACKOUTS

1. *Preparation divided into three phases*
    - a. Initial phase—formulation of plans by all concerned for blacking out installations for which they are directly responsible.
    - b. Preparatory phase—active preparatory measures, securing of necessary blackout materials by plant officials and home owners and preparation for installing them.

- c. Final phase—completion of permanent installations, imposition of lighting restrictions, readiness for the alert upon short notice.

2. *Practice blackouts increase efficiency*
    - a. Permission for local practice blackouts is obtained by local councils of defense from the State Council of Defense, which, in turn obtains the necessary permission from the 1st Interceptor Command.
    - b. Light control and blackout tests, held periodically as soon as preparations are complete, bring to light errors and new problems. The tests can be progressive in scope until a satisfactory standard of efficiency is attained. The best procedure is to have short test periods of about fifteen minutes.
    - c. Tests of whole areas ordinarily are preceded by local tests.
    - d. In area tests, aerial observers have been used successfully to photograph results and to report observations.
    - e. On the basis of observations and reports, mistakes and noncompliances are remedied.
    - f. Detailed blackout procedures should always be undergoing a continuous process of study, trial, improvement, and simplification.
3. *Public cooperation is essential*
    - a. The importance and purpose of blackouts require public explanation, with emphasis on the necessity for whole-hearted cooperation. Newspapers, radio, movies, billboards, and speeches in schools, clubs, etc., have been used successfully.
    - b. Instruction in blackout techniques and individual duties in blackouts through radio and press publicity and talks and demonstrations increases civilian cooperation and blackout effectiveness.
    - c. Adequate publicity preceding announced practice tests makes for maximum effectiveness.
4. *Blackouts present dangerous opportunity for sabotage and other crimes*
    - a. Sabotage and other crimes are facilitated by conditions existing during blackouts.
    - b. Full provision in blackout plans for additional guards helps to meet the problem.
    - c. Local governments use auxiliary police to protect persons and property in general from criminal activities and vandalism.

F. LIGHTING RESTRICTIONS ARE CONVEYED THROUGH THE WARNING SYSTEM

1. *Military commander alerts the area*
    - a. When the Military Commander of the 1st Interceptor Command decides that an air defense region is vulnerable to attack, he may alert that area, even though there appears to be no immediate threat of enemy action.
    - b. Such an alert from the 1st Interceptor Command may be a white light followed by telephone instructions, in which case the regulations which apply to the yellow light alert will not necessarily apply. For example, if the 1st Interceptor Command receives a

report that enemy planes may be on the way to our shores, he may order a white light, followed by telephoned instructions on procedures.

2. *Air raid signals denote restrictions*
   - a. Air raid warning messages will be dispatched from the information and filter centers over the civilian air raid warning system to the civilian defense headquarters and control centers.
   - b. The warning message indicates the type and degree of lighting restrictions to be enforced upon receipt.
     - (1) Yellow—Preliminary Caution
       Essential industry and transportation must get ready to obscure their special lights.
     - (2) Blue—Lights Warning
       Industry and transportation must obscure their special lights at once.
     - (3) Red—Action Warning
       Immediate action in regard to public air raid precautions must be taken. The area is alerted and blackout restrictions are enforced.
     - (4) White—Raiders Passed
       Industry and transportation may resume use of special lights. Army and local regulations will govern resumption of normal lighting for the civilian population.
3. *Lighting restrictions enforced upon the alert*
   - a. Outside illumination reduced to minimum during alert
     - (1) Buildings—All outside lights and all inside lights visible from the outside must be extinguished immediately.
     - (2) Public street lights—All street and alley lights must be extinguished or properly shrouded.
     - (3) Advertising signs—Lights on such signs must be extinguished immediately.
     - (4) Railroads—Lights on railroad lines and in trains will be controlled in conformity with regulations.
     - (5) Vehicles—All lights on vehicles (except specially equipped police, fire, and emergency vehicles) must be extinguished immediately.
     - (6) Flashlights, matches, etc.—No flashlights may be used outside unless the light is properly covered wth deep red cellophane. Smoking and the striking of matches outside will be prohibited.
   - b. Inside Lights
     During an alert, all windows, sky lights and glazed doors must be made light-proof by use of proper coverings. This method of masking interior lighting is called "obscuration," and is discussed in the next section.

G. KNOWLEDGE OF BLACKOUT TECHNIQUES IS HELPFUL

Discussion of blackout methods here is limited to the more elementary obscuration techniques, applicable principally to industrial plants. However, some of the simpler measures are practicable in the home. Obscuration in industrial plants and public buildings will probably go beyond measures described in this section.

1. *Paint is simplest but not best method of treating glass*
   - a. The simplest and quickest method of obscuration or blackout consists of painting over the outside of window panes with various weather-proof compounds such as heavy outside or asphalt paints.
   - b. Black and green obscuring paints are available at reasonable prices.
   - c. Painting gives quickest results in emergencies but is, of course, effective only so long as the glass remains unbroken. More permanent measures are being provided as rapidly as possible in industrial plants. Painting of windows is impracticable in the home.

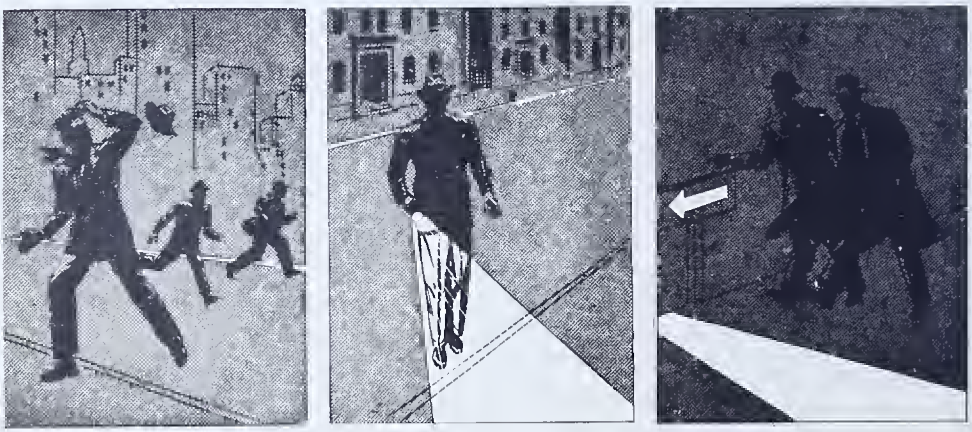
2. *Adhesive materials minimize blast effects and provide obscuration*
   - a. Adhesive materials, such as all-over coatings or strips, and certain materials in liquid form which are applied by brush or spray, will reduce the effects of blast and, to some extent, prevent splintering.
   - b. Requirements for blast-resistant materials:
     - (1) Considerable tensile strength.
     - (2) Strong adherence to the glass.
     - (3) Retention of their properties for a reasonable time under exposure.
     - (4) Adhesives must retain stickiness, not become brittle.
   - c. Suitable materials:
     - (1) Thick, tough paper, preferably with fiber reinforcement, applied with adhesive which remains sticky.
     - (2) Cardboard, with a strong adhesive, for more permanent obscuration.
     - (3) Textile materials, such as cotton, linen, sisal, pressed into a bituminous emulsion; some give permanent obscuration; used on factory sky-lights.
     - (4) Transparent wrapping films, such as celluloid, cellulose, cellulose acetate; provide more light but are not so splinter-resistant.

3. *Sky lights present special problem*
   - a. Obscuration is difficult and danger great

     Obscuration of sky lights is difficult but necessary. Broken glass may do more damage falling from an overhead sky light than from a window.
   - b. There are several patented obscuration systems, applicable to long lengths of sky light. Some of these allow units to fold back during daylight, either mechanically or by hand, and are designed to keep out wind and rain if the glass is broken.
   - c. Wire netting of ½ inch or smaller mesh, firmly fixed below the glass and as near to it as possible, will prevent large fragments of glass from falling.

H. INDIVIDUALS ARE RESPONSIBLE FOR BLACKOUT EFFECTIVENESS

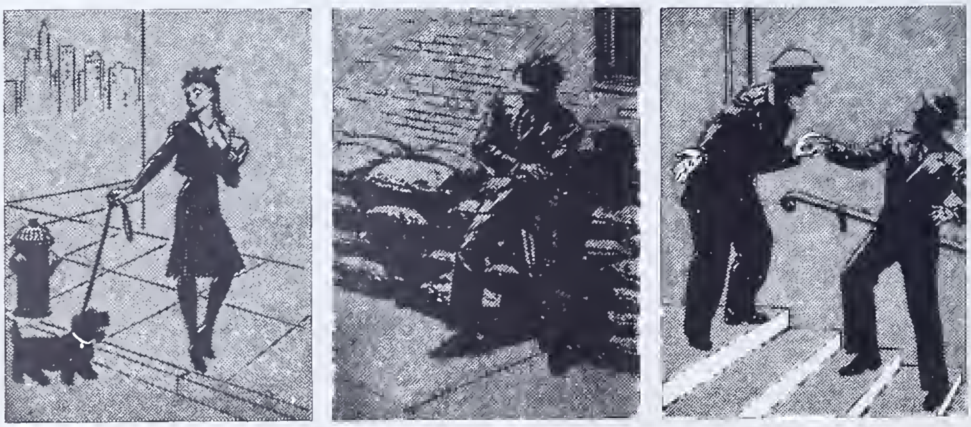
1. *Individuals take personal precautions during blackouts*
   a. When out, and blackouts are likely, wear special blackout apparel.
   b. When air raid warnings sound during blackouts, do not get panicky, but proceed calmly and quickly to cover.
   c. Know the meanings of the various warning signals.
   d. Think over your route before starting out to avoid being lost.
   e. Use your flashlight, if permissible at all, as little as possible and then only for a few seconds at a time to check your location.



DO NOT run when air raid warnings sound after dark during blackouts.

Use your flashlight as little as possible, if at all. Never point it upward not at any object that might reflect upward.

Know where you want to go and how to get there. Keep to the right.



Keep pets on leash if you take them out after dark.

If you are hurt, move to the nearest wall and ask the first persons who come along to report your injury to the nearest first aid station.

If you are not familiar with the neighborhood, ask someone who is or report to the first policeman or air raid warden.

FIGURE 15. BLACKOUT BEHAVIOR

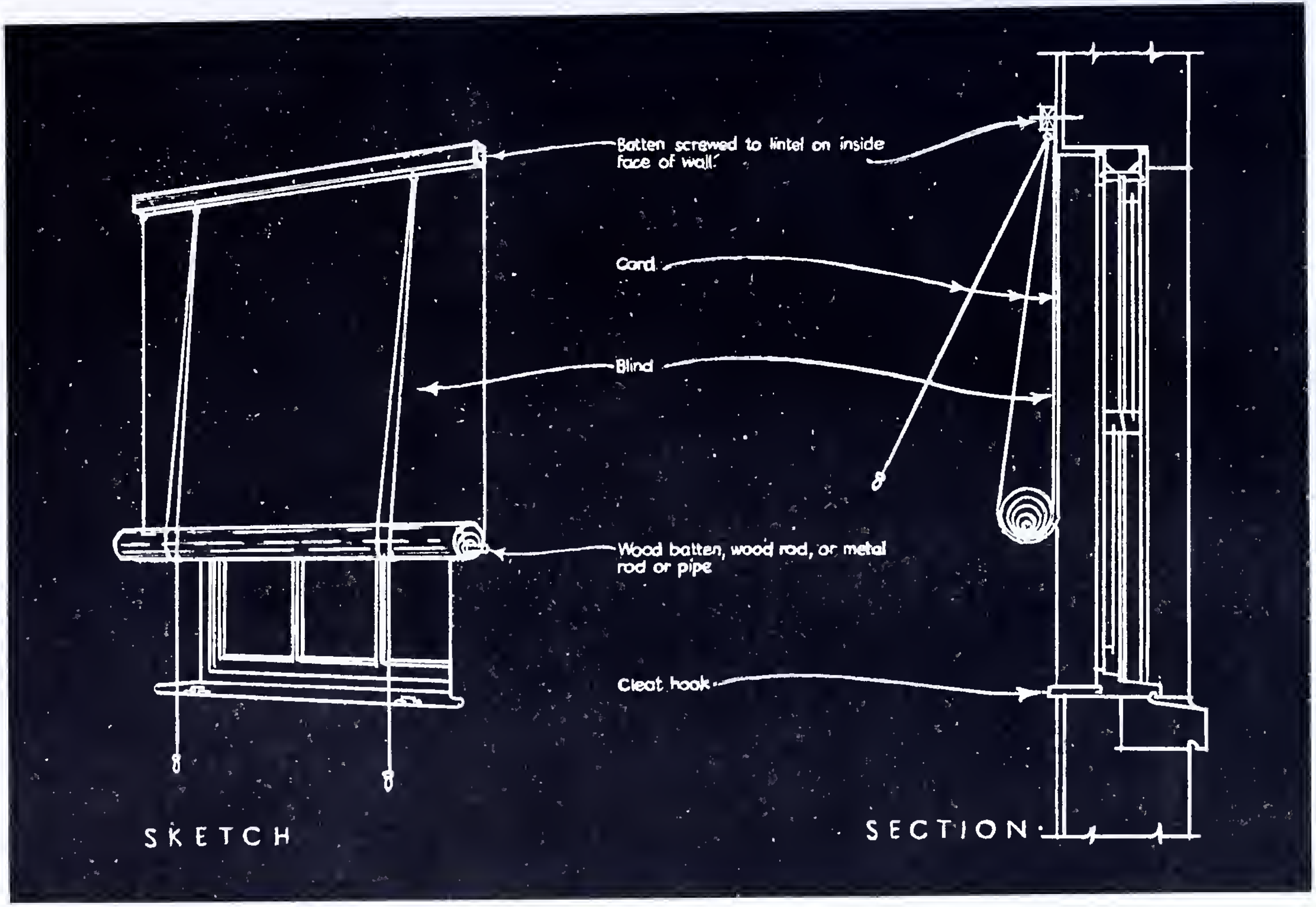

Batten screwed to lintel on inside face of wall.
Cord.
Blind
Wood batten, wood rod, or metal rod or pipe
Cleat hook.
SKETCH
SECTION.

Figure 16. temporary improvised screen blind (window shade).

Never point it upward nor on any object which might reflect it upward. Keep it properly screened with deep red cellophane.

- f. Never smoke in the open.
- g. Keep to the right. Cross streets at intersections or places marked as pedestrian crossings. Observe traffic signals.
- h. Keep pets on leash.
- i. Give assistance to others when necessary.

2. *Safety depends on home preparation for blackouts*
   - a. Provide a refuge room which the members of the household can occupy during air raids with the maximum degree of safety.
   - b. Darken all occupied rooms and turn out the lights in other rooms. Use dark blinds, thick curtains or drapes, special screens, or even blankets to darken every window, sky light or other opening where lights are used after dark.
   - c. Screen all lights near and outside door so that no light is visible when the door is opened.
   - d. Follow scrupulously other blackout regulations issued by local authorities.

I. SIGNS AND MARKINGS ARE AIDS TO TRAVEL DURING BLACKOUTS

1. *Traffic aids are required*
   - a. Screened traffic control signals, direction signs, obstruction lighting.
   - b. Distinguishing marks on the roadway, curbs, trees, lamp posts, walls, etc.
   - c. Highway traffic devices.
   - d. Pedestrian crossing places.
2. *Signs and markings are painted or illuminated*
   - a. Self-luminous paint, of phosphorescent materials or radium compounds can be used.
   - b. Illuminated signs will be properly dimmed, screened or masked.

3. *Blackout devices are required on motor vehicles*
   Dark oilcloth or rubber masks or hoods may be attached to head and tail lights with a horizontal slit in the lower portion about ½″ x 3″ covered inside with darke red cellophane.

REFERENCES:

Blackouts, OCD, August 1941
Glass and Glass Substitutes, OCD, 1941
Proceedings of Plant Protection School, Pennsylvania Council of Defense, 1941
Report of Bomb Tests on Materials and Structures, OCD
Local Ordinances and Regulations on Blackouts.

FIRE DEFENSE A

Control of Incendiaries

Unit V—3 Hours

I. INTRODUCTION

A. Incendiaries Are Highly Destructive

1. Incendiary bombs have been used widely to cause destruction of buildings, crops, food, ammunition, supplies, and other combustible material of military importance. Both the Germans and the Japanese have used incendiaries to devastate production plants, docks, population centers, etc. Most efficient of all incendiaries used is the magnesium bomb.
2. The chief danger from an incendiary bomb attack is the probability that a large number of fires may occur at the same time over considerable areas. Unless the bombs are controlled and fires extinguished immediately, they will give rise to widespread conflagrations which not only produce enormous property damage and dislocation of normal community life, but direct enemy bombers more accurately to their targets.
3. A large bomber can carry 1000 magnesium bombs which are usually released in salvos of 15. In the average normally-built city, about 15 percent of the area is occupied by buildings. Assuming, then, that 15 percent of the bombs hit buildings and only half start fires, 75 fires could be caused simultaneously by a single plane. Since incendiary bomb attacks are executed by squadrons of planes, the number of fires started would be much greater.

B. Proper Organization and Preparation Reduces Damage

1. British experience has proved that effective fire defenses and civilian alertness can greatly reduce damage from incendiary bombs.
2. The regular fire-fighting forces, even augmented by auxiliary firemen, could not cope with the many fires that would be started simultaneously in a single community during an incendiary raid.
3. It is essential, therefore, that citizens as well as members of citizens' defense corps learn thoroughly the methods of controlling and extinguishing incendiary bombs and resultant fires. They cannot rely entirely upon the fire-fighting forces. Householders are responsible for providing their own protection by obtaining necessary fire-fighting equipment. Speed is essential in dealing with incendiaries.

II. TYPES OF INCENDIARY BOMBS

A. Thermit Bombs

1. Composed of a thin, metal case filled with thermit (a mixture of aluminum granules and iron oxide).
2. Range in size from 10 to 132 pounds.

3. Fired with a firing pin on impact, or with a time fuse set to ignite at a predetermined time after release.
4. Thermit, when ignited, reacts chemically and violently to form a mass of molten iron which acts as an incendiary in igniting flammable material with which it comes into contact.
5. Thermit does not depend upon a supply of oxygen from the air to support combustion but any continued incendiary action of the molten iron does.
6. Japan and Germany are prepared to use thermit bombs of both 33-pound and 132-pound types.

B. WHITE PHOSPHORUS BOMBS

1. Composed of a charge of white phosphorus and burster charge in a thin steel container.
2. When exploded the white phosphorus is showered in small particles over an area of 50 to 100 square yards, depending on the size of the bomb.
3. The white phosphorus particles ignite spontaneously upon contact with the air and burn shortly after leaving the shell.
4. Phosphorus ordinarily will not set fire to heavy planks or heavy wooden construction but will readily set fire to more flimsy materials such as wood shingle roofs, dry grass, ripe grain, and woods.
5. The greater danger from white phosphorus bombs is the serious burns caused when they come in contact with the human body.
6. When white phosphorus burns it produces a heavy white smoke and is commonly used for smoke screens. The smoke is harmless but may produce mild throat irritation and coughing.
7. Japanese use the 33-pound and 132-pound types.

C. MULTIPLE EFFECT BOMBS

1. These are large bombs, usually weighing 25 pounds or more, consisting of a large number of separate units of phosphorus and magnesium alloy loaded in a single container.
2. The units are scattered widely when the bomb explodes.
3. Used principally for important targets such as refineries and factories.

D. OIL BOMBS

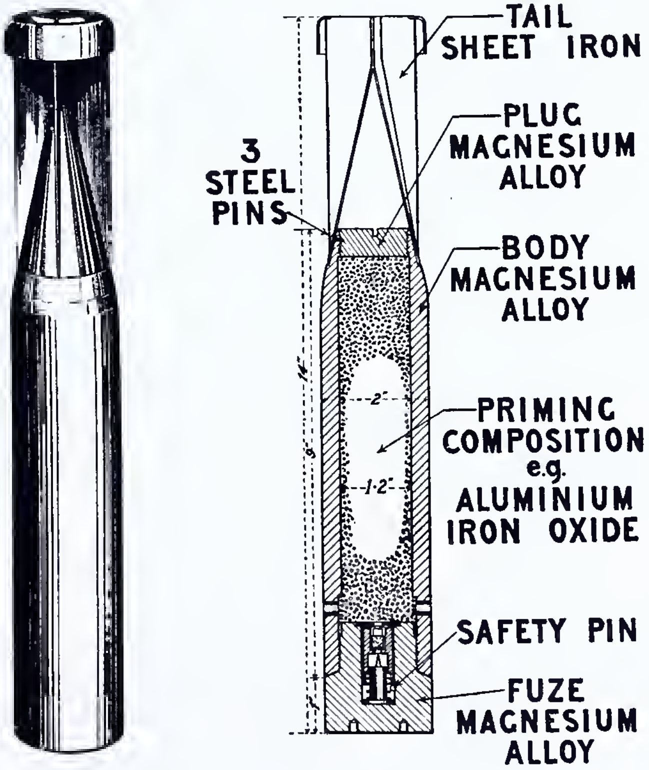
1. Solid oil enclosed in a huge drum is used in a scatter-type incendiary. Finely divided metallic sodium or potassium or sodium hydride is sometimes added to rekindle the fire by chemical action if the oil comes in contact with water.
2. Liquid oil also is used as a scatter-type incendiary. Large drums of flammable oils fitted with a simple fuse arrangement are used against definite targets of great military importance. The oil is scattered and ignited by a black powder burster charge upon impact. The certainty of ignition and violence of the burning may be increased by diluting the oil with gasoline, turpentine, or other highly flammable liquids. On burning, these materials produce heat which is nearly twice that produced by an equal amount, by weight, of magnesium alloy.

E. Incendiary Leaves or "Calling Cards"

1. These are four-inch moist cards which are treated with a small amount of phosphorus.
2. They burst into flame as the moisture evaporates.
3. Thousands of such cards can be scattered by a single plane on one raid.
4. They are used particularly to set fire to fields of ripe grain, dry woods, or combustible roofs.

F. Magnesium or Electron Bomb

1. *Small magnesium or electron bomb is most effective and most-used incendiary*
   - a. Weighs about 2.2 pounds.
   - b. About one in ten electrons is equipped with a small explosive charge which is added primarily to discourage fire fighters from approaching the burning bombs.
   - c. The electron has been used extensively by the Germans.



TYPICAL KILO MAGNESIUM (ELECTRON) INCENDIARY BOMB

Figure 17.

- d. There are also medium and large electron bombs, weighing 4.5 to 55 pounds.

2. *Bomb is shaped like a tube*
   - a. Case is a thick-walled cylinder of combustible magnesium alloy. It is two inches in diameter and nine inches long. Close to the nose is a ring of vent holes around the cylinder.
   - b. Core or filling is a thermit priming composition (aluminum and iron oxide) which is ignited by a "first fire" mixture such as aluminum powder, barium nitrate, and black powder. Unlike thermit bombs, the thermit in electrons is not the main incendiary material, but is used only to ignite the magnesium.
   - c. One end is fitted with a 5-inch sheet-iron tail with metal fins to steady the bomb in flight and to cause it to strike on its nose. With fins, the bomb is 14 inches long.
   - d. An ignition device located in the nose goes off when the bomb strikes, thus firing the starting mixture and the thermit, which burns with sufficient heat to ignite the casing.
3. *Magnesium bomb burns violently*
   - a. Initial stage—1 minute
     - (1) The bomb begins to function 15 to 20 seconds after impact. During this time it may be possible to throw the bomb into a protective receptacle or out into the open, where it should be controlled with sand.
     - (2) The thermit burns fiercely for about 50 seconds at the terrific temperature of 4500 degrees Fahrenheit. The heat that is generated is sufficient to ignite the magnesium alloy case.
     - (3) Thermit contains its own oxygen (iron oxide) and therefore does not depend upon oxygen from the air.
     - (4) The thermit burns with a violent spluttering. Flame shoots from the vent holes, and pieces of molten metal are forced through these holes and scatter over a radius of 50 feet.
     - (5) About one of every ten bombs contains an explosive charge which usually goes off within two minutes after the bomb strikes. These "discourager bombs," as they are called, cannot be distinguished by their appearance. The individual must take precautions against injury from such possible explosions.
   - b. Main stage lasts from 10 to 15 minutes
     - (1) After the initial stage the bomb burns less fiercely.
     - (2) The magnesium alloy which has been ignited by the burning thermit burns at a temperature of 2300 degrees Fahrenheit for about 10 or 15 minutes, if not controlled, and gives off a blinding white glare.
     - (3) The magnesium, unlike thermit, depends upon a supply of oxygen from the air to continue burning, and therefore can be controlled during this stage. (See III. below).
4. *Magnesium (electron) bomb has limited penetrative power*
   - a. The small electron has purposely been designed to have low powers of penetration. While it will penetrate an ordinary roof

(slate, tile, or corrugated iron) if dropped from a height of a mile or more, it is likely to remain in the attic or upper floor. Thus, the fire will be less accessible and the fire fighter will have difficulty in controlling it.

b. If there is a boarded floor immediately below the roof, the bomb probably would not penetrate it, but it might burn through the ceiling and fall into the room below, or molten magnesium might run through cracks in the flooring.

c. When an incendiary bomb has penetrated a building, it becomes immediately necessary:
   (1) To control the bomb and prevent it from burning through the floor, and
   (2) To subdue and localize the fire resulting from the bomb. No hard and fast rule can be laid down as to which should be dealt with first. The seriousness of fires, the position of the bomb, the equipment available—all affect the choice of action.

III. SEVERAL METHODS ARE RECOMMENDED FOR FIGHTING MAGNESIUM BOMBS

A. Water Spray Is Best Method

1. *Water accelerates combustion*

   a. After the initial period of violent burning has passed, water may be sprayed upon the bomb from close quarters. Water accelerates the burning of the magnesium by supplying it with extra oxygen, and, therefore, causes the bomb to burn itself out in two or three minutes. Six to eight gallons of water are needed to consume the bomb and extinguish any normal fire in the room.

   b. Warning! Water thrown from a bucket or projected in a solid stream or jet will cause violent spluttering and scattering of the molten metal. If water is applied directly and too fast, the the hydrogen and steam which is produced may accumulate faster than it can burn and cause a violent explosion.

2. *Stirrup hand-pump or similar appliance is good control device*

   a. This type of appliance is well recommended for dealing with incendiary bombs and resultant fires.
      (1) It enables the operator to fight the fire from a safe distance and away from the intense heat, smoke, and glare.
      (2) It provides a means of attacking both the fire and the bomb, each of which requires separate treatment. To change from a spray to a jet it is necessary only to press a lever on the base of the nozzle.
      (3) It is economical in water consumption; six to eight gallons usually are sufficient.
      (4) It is not dependent on ordinary water supply and pressure, since it is a hand-operated pump, and the necessary water can be drawn in advance.

   b. Construction is well-adapted to the job

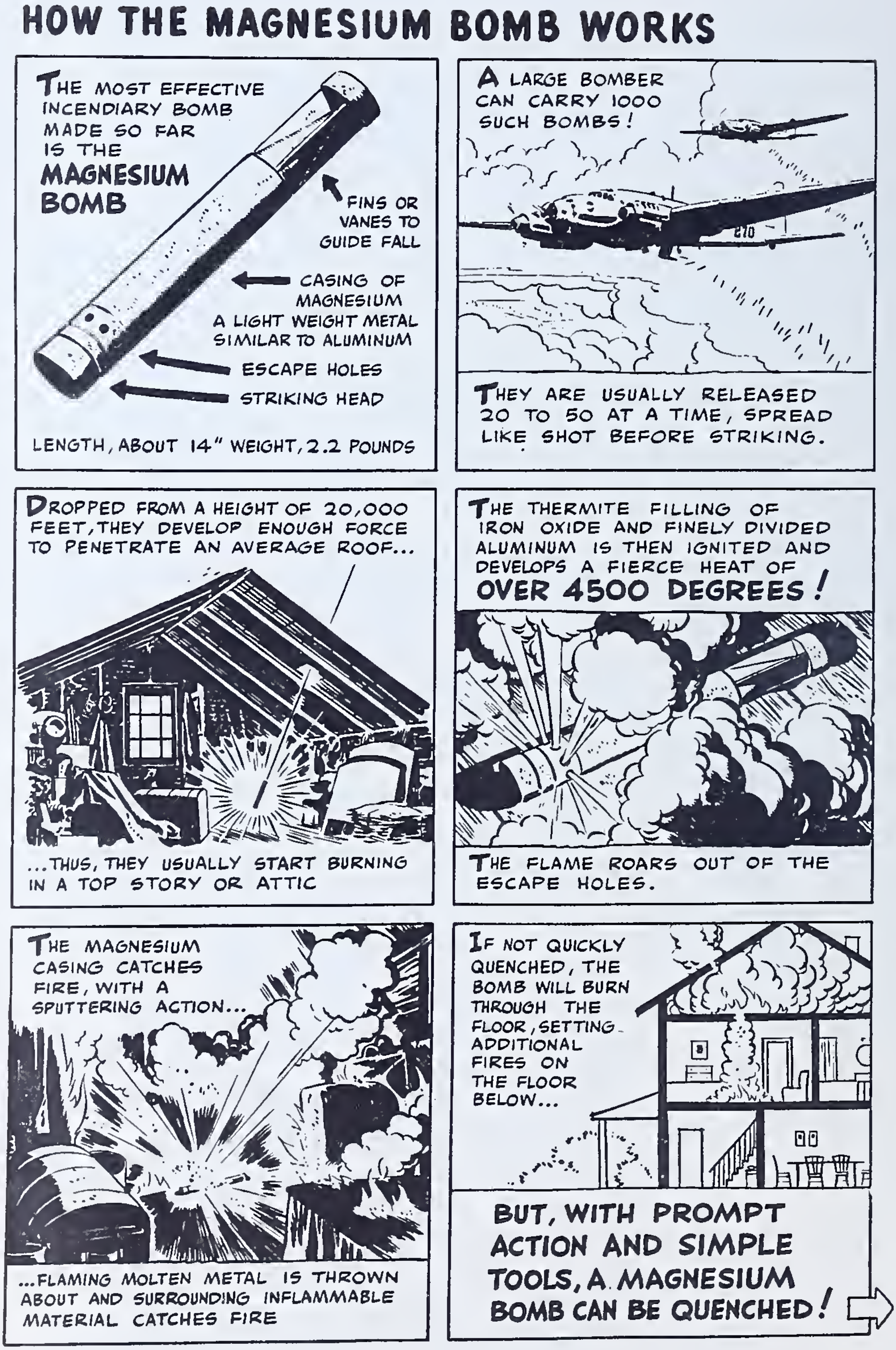

HOW THE MAGNESIUM BOMB WORKS
THE MOST EFFECTIVE INCENDIARY BOMB MADE SO FAR IS THE MAGNESIUM BOMB
FINS OR VANES TO GUIDE FALL
CASING OF MAGNESIUM A LIGHT WEIGHT METAL SIMILAR TO ALUMINUM
ESCAPE HOLES
STRIKING HEAD
LENGTH, ABOUT 14" WEIGHT, 2.2 POUNDS
A LARGE BOMBER CAN CARRY 1000 SUCH BOMBS!
THEY ARE USUALLY RELEASED 20 TO 50 AT A TIME, SPREAD LIKE SHOT BEFORE STRIKING.
DROPPED FROM A HEIGHT OF 20,000 FEET, THEY DEVELOP ENOUGH FORCE TO PENETRATE AN AVERAGE ROOF...
...THUS, THEY USUALLY START BURNING IN A TOP STORY OR ATTIC
THE THERMITE FILLING OF IRON OXIDE AND FINELY DIVIDED ALUMINUM IS THEN IGNITED AND DEVELOPS A FIERCE HEAT OF OVER 4500 DEGREES!
THE FLAME ROARS OUT OF THE ESCAPE HOLES.
THE MAGNESIUM CASING CATCHES FIRE, WITH A SPUTTERING ACTION...
...FLAMING MOLTEN METAL IS THROWN ABOUT AND SURROUNDING INFLAMMABLE MATERIAL CATCHES FIRE
IF NOT QUICKLY QUENCHED, THE BOMB WILL BURN THROUGH THE FLOOR, SETTING ADDITIONAL FIRES ON THE FLOOR BELOW...
BUT, WITH PROMPT ACTION AND SIMPLE TOOLS, A MAGNESIUM BOMB CAN BE QUENCHED!

FIGURE 18.

CONTROLLING WITH SAND

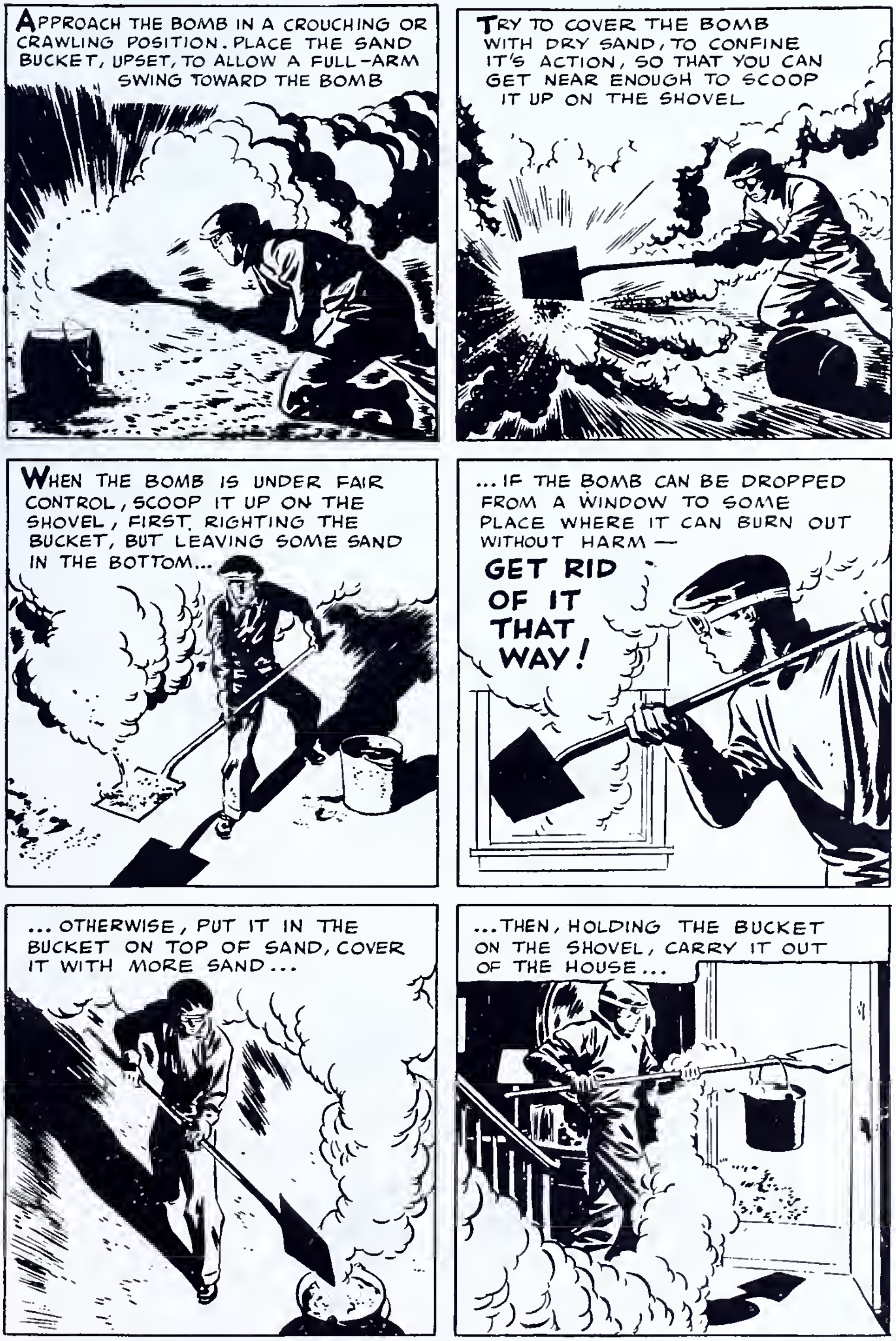

APPROACH THE BOMB IN A CROUCHING OR CRAWLING POSITION. PLACE THE SAND BUCKET, UPSET, TO ALLOW A FULL-ARM SWING TOWARD THE BOMB
TRY TO COVER THE BOMB WITH DRY SAND, TO CONFINE IT'S ACTION, SO THAT YOU CAN GET NEAR ENOUGH TO SCOOP IT UP ON THE SHOVEL
WHEN THE BOMB IS UNDER FAIR CONTROL, SCOOP IT UP ON THE SHOVEL, FIRST, RIGHTING THE BUCKET, BUT LEAVING SOME SAND IN THE BOTTOM...
...IF THE BOMB CAN BE DROPPED FROM A WINDOW TO SOME PLACE WHERE IT CAN BURN OUT WITHOUT HARM —
GET RID OF IT THAT WAY!
...OTHERWISE, PUT IT IN THE BUCKET ON TOP OF SAND, COVER IT WITH MORE SAND...
...THEN, HOLDING THE BUCKET ON THE SHOVEL, CARRY IT OUT OF THE HOUSE...

FIGURE 19.

CONTROLLING WITH WATER

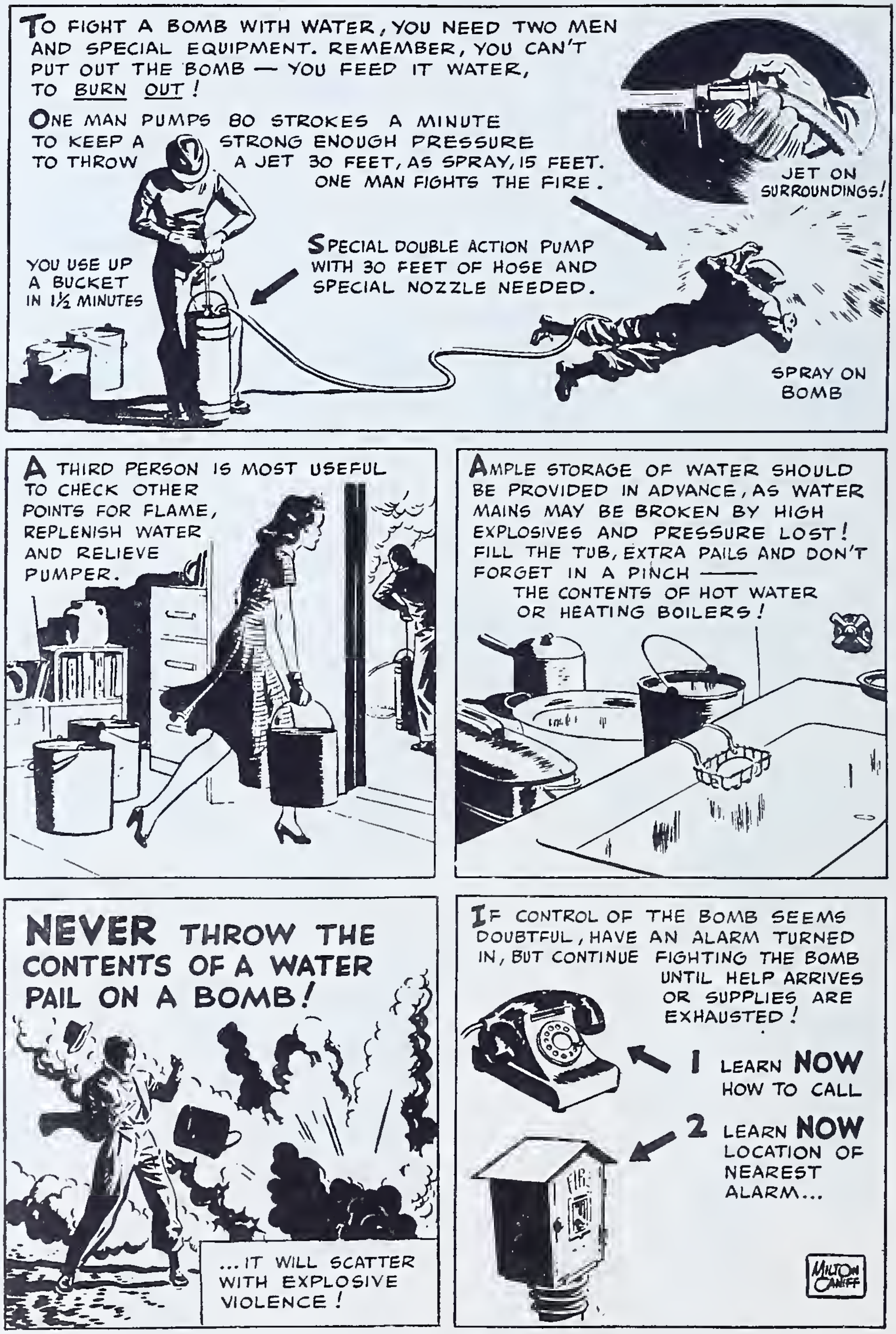

TO FIGHT A BOMB WITH WATER, YOU NEED TWO MEN AND SPECIAL EQUIPMENT. REMEMBER, YOU CAN'T PUT OUT THE BOMB — YOU FEED IT WATER, TO BURN OUT!
ONE MAN PUMPS 80 STROKES A MINUTE TO KEEP A STRONG ENOUGH PRESSURE TO THROW A JET 30 FEET, AS SPRAY, 15 FEET. ONE MAN FIGHTS THE FIRE.
JET ON SURROUNDINGS!
YOU USE UP A BUCKET IN 1½ MINUTES
SPECIAL DOUBLE ACTION PUMP WITH 30 FEET OF HOSE AND SPECIAL NOZZLE NEEDED.
SPRAY ON BOMB
A THIRD PERSON IS MOST USEFUL TO CHECK OTHER POINTS FOR FLAME, REPLENISH WATER AND RELIEVE PUMPER.
AMPLE STORAGE OF WATER SHOULD BE PROVIDED IN ADVANCE, AS WATER MAINS MAY BE BROKEN BY HIGH EXPLOSIVES AND PRESSURE LOST! FILL THE TUB, EXTRA PAILS AND DON'T FORGET IN A PINCH —— THE CONTENTS OF HOT WATER OR HEATING BOILERS!
NEVER THROW THE CONTENTS OF A WATER PAIL ON A BOMB!
... IT WILL SCATTER WITH EXPLOSIVE VIOLENCE!
IF CONTROL OF THE BOMB SEEMS DOUBTFUL, HAVE AN ALARM TURNED IN, BUT CONTINUE FIGHTING THE BOMB UNTIL HELP ARRIVES OR SUPPLIES ARE EXHAUSTED!
1 LEARN NOW HOW TO CALL
2 LEARN NOW LOCATION OF NEAREST ALARM...
FIRE
MILTON CANIFF

FIGURE 20.

    (1) It is fitted with a dual-purpose nozzle which can produce either a spray or an ⅛ inch jet of water, as desired.
    (2) It is equipped with 30 feet of hose, thus permitting the pump-operator to be well away from the heat, smoke, and glare while the person at the nozzle advances to attack the bomb and the fire at close range.
    (3) The pump itself stands in a bucket which must be kept supplied with water.

c. Pump needs little care
    (1) Normally the pump should require no attention.
    (2) When using dirty water, the foot strainer may become choked with debris. This can be removed easily with the fingers.
    (3) If the nozzle becomes choked, unscrew it and clear it quickly. If the spray is irregular or one-sided, check the spray openings for obstructions.

d. One, two, or three persons can handle an incendiary.
    (1) Three can do the job most efficiently.
    No. 1 man takes charge of the fire fighting and operates the nozzle.
    No. 2 man pumps the water from a bucket
    No. 3 man keeps the bucket replenished with water, relieves
    No. 2 when necessary, and watches for molten metal burning through to the next lower floor. When the ceiling of the next lower story shows discoloration, a bucket of sand is placed directly beneath to catch falling molten magnesium.
    (2) When there are only two men available, No. 1 takes the nozzle and No. 2 operates the pump and replenishes the supply of water. This may interrupt the fire-fighting and prevent obtaining a steady flow of water.
    (3) When only one person is available, he takes the pump and one bucket and operates the nozzle from the pumping position.

3. *Garden hose is a fair substitute*

a. A simpler means of applying water to an incendiary bomb is an ordinary garden hose attached to the nearest faucet in the house. If the hose is sufficiently long to reach any part of the house, and the municipal water supply is maintained at a sufficient pressure, the garden hose method will serve very well. The rules for directing the water in a spray upon the bomb apply here.

b. Reliance upon garden hoses is not generally recommended. When water is being drawn in large quantities by fire engines from the city mains, household pressure will drop so that a sufficient stream could not be obtained in the upper floors of a house. Also, water mains may be burst by high explosive bombs and the city water supply to the house may fail at a critical time.

4. *Both bomb and fire must be controlled*
   The normal sequence of action in combating incendiary bombs and resultant fires by the water method is as follows:
   a. Control the fire first, using a jet of water. This will enable the operator to get close enough to the bomb to direct the spray upon it.
   b. Direct the spray on the bomb. The operator should cautiously work nearer to the bomb until he is about six feet away from it. The bomb should be sprayed until it is consumed, but it may be necessary to stop the spray occasionally to keep the fire under control with the jet.
   c. As soon as the bomb has burned itself out, make a thorough search for smouldering fires in unseen places. If necessary, lift floor boards or remove panelling and skirting from the walls.
5. *Hose operator should take safety precautions*
   a. Wear heavy gloves.
   b. Wear dark or smoked glasses, not colored ones, for protection against sputtering metal and the glare of burning magnesium.
   c. An axe or hatchet should be handy to clear away obstacles in the approach to the bomb.
   d. Use an overturned table, chair or door for protection against flying metal in case the bomb should explode. A wet blanket thrown over the shoulders is some protection against sputtering fragments.
   e. Lie down and keep face close to the floor where it is easier to see and breathe.
   f. Use an electric torch or searchlight in making the final search for smouldering remains.

B. SAND IS EFFECTIVE

1. *Sand decreases intensity of burning*
   In the sand method of control, no attempt is made to accelerate the burning of the bomb. The bomb is covered with dry sand or similar material to cut off the supply of air upon which magnesium depends for its supply of oxygen. This reduces both the glare and the heat.
2. *Use sand outside and when surroundings are not combustible*
   a. Sand should be used indoors only when the bomb has fallen on a surface and in surroundings which are not readily combustible or in the absence of a hand-pump or garden hose and water. Sand cannot be used when the incendiary has caused a fire so extensive as to prevent close approach.
   b. Sand should be used out of doors, where the fire danger is slight. It should always be used out of doors at night to prevent the bomb's glare from serving as a guide to raiding planes.
3. *Use scoop and bucket to remove bomb*
   a. Method
      (1) Dump about ¾ of a bucket of dry sand on the floor about six feet from the bomb. If the sand is damp or wet, the magnesium will be fed additional oxygen from the water

and burn more violently. Use a long-handled scoop or shovel to place the sand around and on the bomb until the glare and heat are reduced.

(2) Scoop up the bomb and the covering sand and drop into the bucket, which still contains about four inches of sand to prevent the magnesium from melting through. Cover the bomb with the sand remaining on the floor to a depth of at least four inches.

(3) Remove the receptacle, with the bomb in it, to a safe place. Carry the receptacle at the end of the scoop or a pole. While the bomb is being removed, it is desirable that a second person be present to fight the fire caused by the bomb.

(4) Use an ordinary fire extinguisher or water to put out fire after removal of the bomb. This should suffice inasmuch as the sand method is used only when there is little or no fire.

b. Equipment needed to remove a magnesium bomb

(1) Long-handled scoop or shovel.
(2) Coal scuttle, bucket, or similar receptacle.
(3) At least one bucket of dry sand.
(4) Dark goggles for protection against glare and spluttering particles.

C. PITCH SMOTHERS MAGNESIUM BOMBS

1. *Spread pitch over bomb*

a. A hard coal-tar pitch which has a softening point of about 300° Fahrenheit may be used in fighting magnesium bombs. When spread over burning magnesium, the pitch softens and forms an air-tight seal which cuts off the supply of oxygen and smothers the fire. Burning thermit, unlike magnesium, contains its own oxygen and pitch is therefore ineffective against it.

b. The type of pitch used should pass through six mesh sieve but should be coarser than 35 mesh. Flake pitch under 35 mesh with fine dust removed may also be used. Pitch is easily available and inexpensive.

c. The method used in extinguishing bombs with pitch depends upon the type of surface upon which the bomb lies.

(1) Dry ground, concrete, or metal surface
Spread a layer of pitch over the bomb with a long-handled scoop or shovel to guard against flying fragments. Do not throw the pitch at the bomb.

(2) Wood floor
Spread a layer of pitch on the floor near the bomb, roll the bomb on to this layer, and cover it with more pitch. Use a long-handled scoop or shovel.

d. With this method, the magnesium bomb is completely extinguished and it is not necessary to remove it immediately.

2. *Use pitch in public buildings and industrial plants*

a. The use of pitch is recommended principally for industrial plants, public buildings, and other large structures, where trained fire watchers are employed and where supplies of pitch can be kept at strategic locations. Pitch is not recommended for use in homes and small buildings.

b. About 25-pound lots of pitch should be held in readiness at various places on the upper floors of plants or buildings.

c. The necessary equipment should be kept readily available. This includes long-handled scoop or shovel and buckets to hold the pitch.

D. Certain Fire Extinguishers May Be Used

1. *Water-type and foam extinguishers are suitable*

a. All water solution types, including soda acid and plain water extinguishers, may be used. Foam type extinguishers may also be used. Turn the extinguisher upside down to create pressure. Get a spray effect by placing the thumb over the nozzle. Use a jet on surrounding fires.

b. One extinguisher does not contain enough liquid to burn out a magnesium bomb, and extinguishers cannot be refilled conveniently. Therefore, the use of extinguishers is not recommended unless a sufficient number of them is available.

2. *Never use carbon tetrachloride extinguishers on magnesium bombs*

If the label indicates that the extinguisher is of the carbon tetrachloride type, do not under any circumstances use it on a magnesium bomb. It not only is ineffective but may cause dangerous gas to be generated.

IV. BOMBS OTHER THAN MAGNESIUM BOMBS CAN BE EXTINGUISHED

A. White Phosphorus Bombs Can Be Extinguished With Water or Copper Sulphate

1. *Use copper sulphate solution if available*

Spray or throw copper sulphate solution on the burning phosphorus particles. This will stop the burning and cause a chemical reaction which results in the formation of a thin coating of metallic copper over the phosphorus particle. Let the particles cool and solidify, remove them to a safe place, and burn them.

2. *Water may be used*

Water may be used to extinguish the phosphorus by keeping it constantly wet until it can be removed to a safe place and allowed to burn itself out. As soon as the water evaporates, phosphorus particles reignite.

3. *Exercise great care in extinguishing phosphorus bombs*

Phosphorus not only causes severe and painful burns when it comes in contact with the body, but also has a poisonous effect on the system. Due care must therefore be taken in dealing with it. Be certain to remove every particle of burning phosphorus.

B. Oil Bombs Can Be Controlled In Several Ways

1. *Water and fire extinguishers are effective*

Use water or any of the usual types of fire extinguishers. Take care not to spread the burning oil; do not direct a stream of water on it. Spray surroundings with water to restrict the fire.

2. *Sand may also be used*
   Some fires can be effectively extinguished by smothering them with sand.

C. Sodium and Potassium Bombs Are Controlled With Sand.

1. *Smother with sand*
   The best method of dealing with sodium or potassium incendiary materials is to smother them with sand.
2. *Use water on surroundings*
   An alternative method is to spray combustible surroundings with water and let the bomb burn itself out. *Never* use water on a sodium or potassium bomb itself or on any surrounding incendiary liquid.

D. Multiple-Effect Bombs Are Controlled With Water

These bombs are composed of separate units of magnesium alloy and phosphorus. Each type requires a separate treatment.

1. *Spray magnesium units with water*
   Spray magnesium units with water or cover with sand and remove to a safe place.
2. *Extinguish phosphorus with water*
   a. Extinguish burning phosphorus with water or copper sulphate solution and remove to a safe place, or
   b. Let the particles burn out while controlling the fire with water.

E. Incendiary Leaves or "Calling Cards" Are Controlled With Water or Copper Sulphate

Immerse them in water or copper sulphate solution or let them burn in a safe place.

F. Duds and Apparent Duds Are Removed By Bomb Squads

1. Bombs which land without exploding or burning may be delayed-action bombs and may also be high explosives. Hence, it is extremely dangerous for unskilled persons to handle them.
2. Vacate the premises immediately and notify your air raid warden. The job of removing an unexploded bomb is a highly specialized operation delegated to the bomb squad.

V. FIRES CAUSED BY INCENDIARIES MUST BE EXTINGUISHED

A. Observe General Rules for Fire-Fighting

1. Use water on small fires resulting from incendiary bombs. Extinguishers may be used, but be careful not to direct the liquid upon magnesium or phosphorus bombs.
2. Check all possibilities of fire under the flooring, and seepage of molten metal to floors below. Place a sand-filled receptacle below the spot on the floor on which an electron or other bomb is lying. Discoloration of the ceiling will usually indicate that spot.
3. Evacuate the building of all persons not required to assist in fighting the fire.

4. Large fires which may get out of control, should be reported to the air raid warden who will summon the fire-fighting forces through the control center. Continue to fight the fire with all available equipment. In emergencies, the fire department cannot always be relied on to reach all fires.

B. Fire Fighting Technique Depends On Type of Burning Materials

Material on Fire	**How to Fight It**
1. Wool, textile, rubbish, etc. (Indoors or outdoors.)	Use water or any type of chemical fire extinguisher.
2. Oils, greases, inflammable liquids, or materials impregnated with such.	Cautiously flood with water to dilute, but not to float away, burning liquids. Chemical fire extinguishers of the vaporizing liquid, foam, and carbon dioxide types may extinguish small fires. Sand may also be used to absorb burning liquid.
3. Household and industrial fires in which electrical equipment is exposed.	Use water or fire extinguishers of foam, vaporizing liquid, or carbon dioxide types, but only if voltage is low or current off. Otherwise, use fire extinguisher of vaporizing liquid type, in which the liquid is a non-conductor.
4. Automobile, trucks, buses, etc.	Extinguish by chemical fire extinguishers of vaporizing liquid or carbon dioxide type.

C. Learn Rules for Escape or Rescue From Burning Buildings

If a fire gets out of control the following rules should be followed by those caught in the burning building or who enter to rescue others.

1. In searching a house for occupants, start at the top and work down.
2. Crawl along floor with head low, to avoid smoke and heat.
3. Close doors and windows to cut off draughts and to reduce the spread of the fire.
4. Do not use burning passages or stairways if rescue can be made through a window.
5. When using stairways or passages or escaping from burning rooms, keep close to the walls where there is greater support for the floor.
6. To escape from a window without the aid of rope, sit on the sill, turn around, lower the body to the full extent of the arms, and drop with the knees bent. Escape from windows on floors above the first should be attempted only as a last resort, unless directed by a fireman.
7. If the door of a burning room opens outward, open it carefully using a foot to prevent a sudden out-swing because of pressure.

FIRE DEFENSE

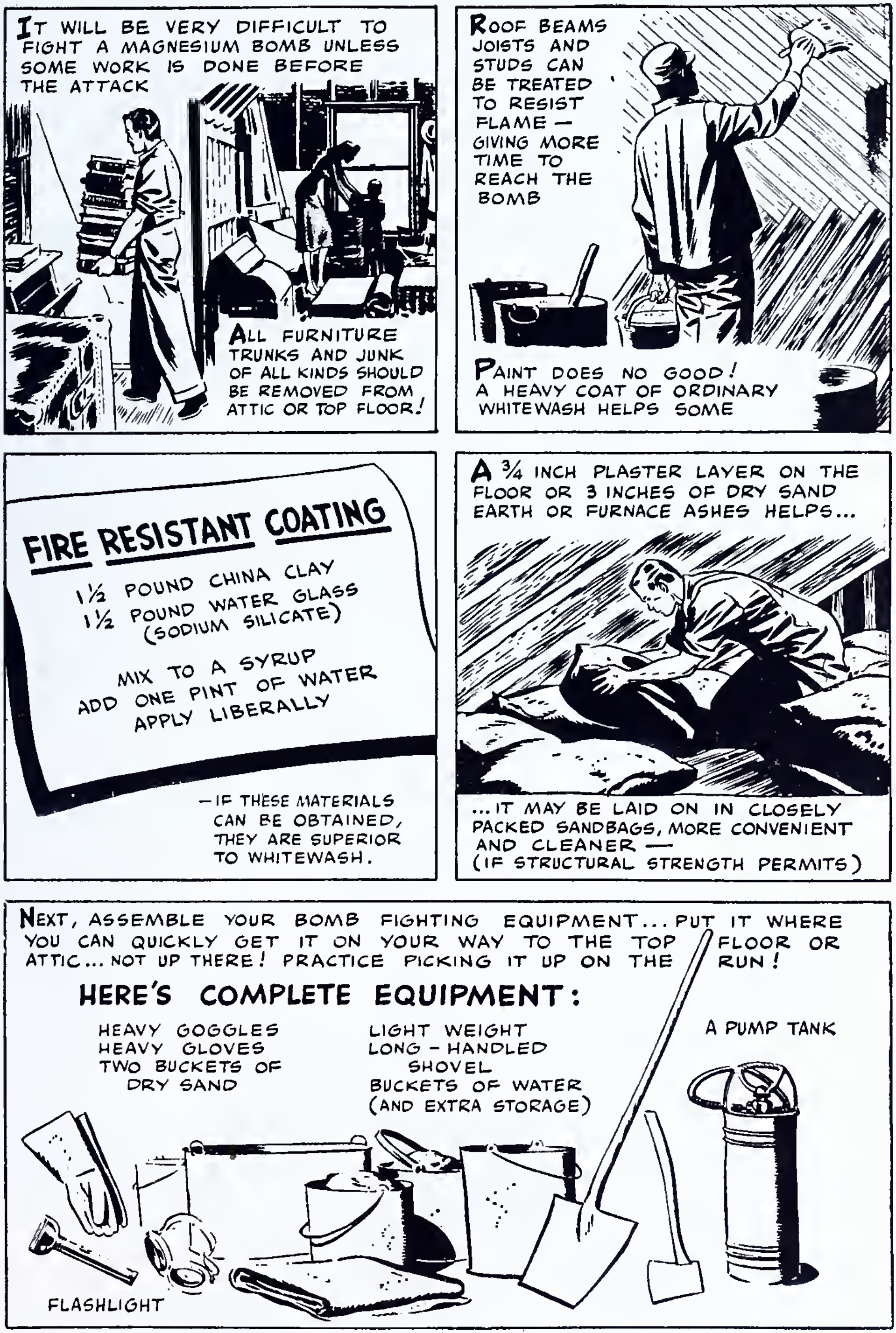

IT WILL BE VERY DIFFICULT TO FIGHT A MAGNESIUM BOMB UNLESS SOME WORK IS DONE BEFORE THE ATTACK
ALL FURNITURE TRUNKS AND JUNK OF ALL KINDS SHOULD BE REMOVED FROM ATTIC OR TOP FLOOR!
ROOF BEAMS JOISTS AND STUDS CAN BE TREATED TO RESIST FLAME — GIVING MORE TIME TO REACH THE BOMB
PAINT DOES NO GOOD! A HEAVY COAT OF ORDINARY WHITEWASH HELPS SOME
FIRE RESISTANT COATING
1½ POUND CHINA CLAY
1½ POUND WATER GLASS (SODIUM SILICATE)
MIX TO A SYRUP
ADD ONE PINT OF WATER
APPLY LIBERALLY
—IF THESE MATERIALS CAN BE OBTAINED, THEY ARE SUPERIOR TO WHITEWASH.
A ¾ INCH PLASTER LAYER ON THE FLOOR OR 3 INCHES OF DRY SAND EARTH OR FURNACE ASHES HELPS...
...IT MAY BE LAID ON IN CLOSELY PACKED SANDBAGS, MORE CONVENIENT AND CLEANER — (IF STRUCTURAL STRENGTH PERMITS)
NEXT, ASSEMBLE YOUR BOMB FIGHTING EQUIPMENT... PUT IT WHERE YOU CAN QUICKLY GET IT ON YOUR WAY TO THE TOP FLOOR OR ATTIC... NOT UP THERE! PRACTICE PICKING IT UP ON THE RUN!
HERE'S COMPLETE EQUIPMENT:
HEAVY GOGGLES
HEAVY GLOVES
TWO BUCKETS OF DRY SAND
LIGHT WEIGHT LONG-HANDLED SHOVEL
BUCKETS OF WATER (AND EXTRA STORAGE)
A PUMP TANK
FLASHLIGHT

FIGURE 21.

Open it steadily and use it as a shield; then lie down and crawl into the room.

8. To move an unconscious person from a burning building, lay him on his back and tie his wrists together. Then kneel astride him, put his arms around your neck and crawl. To move the person downstairs, lay him on his back with head toward the stairs. Hold him under the armpits and drag him carefully down the steps.

VI. ADVANCE PREPARATIONS MINIMIZE DAMAGE

A. Minimum Precautions Are Immediate Need

1. Every adult in every family should learn the methods for dealing with bombs and fires. Duties should be allotted to each in advance.
2. Preliminary drill in which each person practices his special duties is essential, especially in large concerns.
3. Appropriate appliances should be obtained before they are required. Supplies of water, and of sand or dry earth should always be on hand.
4. Spaces under the roof, such as attics, in which incendiary bombs are most likely to lodge, should be cleared of combustible material beforehand, and ready access to these places provided.
5. The following equipment should be kept in convenient places in each household for use in the event of incendiary bombing: blanket, sand, longhandled shovel or scoop, buckets, stirrup hand-pump or garden hose with necessary attachments, axe or hatchet, heavy gloves, smoked glasses, flash light and first-aid kit.
6. If air raids are immediately imminent, sand should be kept on the roof and in the house, ready for use. A water barrel should be kept filled on the roof or in the attic, and the bath tub and other containers should be kept full of water.

B. Further Precautions Give Added Security

1. *The floors of attics may be covered with a non-inflammable material such as:*
    a. Two to two and one-half inches of dry sand, earth sifted ashes or foamed slag;
    b. A sheet of 20-gauge corrugated iron, insulated from the floor by a thin layer of sand;
    c. Three-quarter inch layer of asbestos boarding.
2. *Flat roofs may be covered with a layer of sand bags.* The following materials of the specified thicknesses have been found to withstand the impact of a magnesium bomb:
    a. Reinforced concrete, 3½ to 4 inches.
    b. Sand, earth, 6 inches.
    c. Shingle, 6 inches.
    d. Mild steel plate, ¼ inch.
3. *To reduce fire risk in attics* further, the rafters, joists, and other woodwork may be coated with fire-resisting paint or heavy whitewash.
4. *Rugs may be taken up and curtains and drapes removed.*

REFERENCES:

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GAS DEFENSE A

The Civilian Gas Mask

Unit VI—2 hours

Note: When gas masks are available, this course of instruction should be supplemented by drill in:

1. Putting on and adjusting the mask
2. Testing for gas
3. Removing the mask
4. Inspection of the mask

I. INTRODUCTION

A. GAS MASKS PROTECT THE EYES AND LUNGS

A gas mask is a device which is worn over the face to protect the eyes, respiratory passages, and lungs from toxic gases, irritating gases and smoke present in the air. Gas masks do not supply air. They merely filter and purify air which is drawn through them.

B. SPECIAL TYPES OF MASKS ARE NOT ADAPTED TO GAS PROTECTION

There are many different types of gas masks. Some of them, used in industries, are designed for particular purposes, for instance, to protect against ammonia fumes in refrigeration plants, or for protection against high concentrations of certain gases used for fumigation, or to protect firemen against carbon monoxide. These special masks are not designed for protection against war gases and should not be used for that purpose. Some masks are fitted with a self-contained oxygen breathing apparatus. Civilian masks do not include such apparatus; rather, they are of the canister or filter type.

II. THE CIVILIAN GAS MASK PROVIDES INDIVIDUAL PROTECTION

A. GAS MASK EQUIPMENT CONSISTS OF FACEPIECE, CANISTER, AND CARRIER

1. *Facepiece is adjustable*
   a. Made of gas-resistant fabric or rubber.
   b. Designed to fit any size and type of adult face. Small and medium sizes of facepieces are required for children.
   c. Fitted with eyepieces and head-harness consisting of six elastic straps with buckles for adjustment.
   d. One-way outlet valve, consisting of rubber disk and valve set, permits passage of expired air only.
   e. Canister is attached to facepiece.
2. *Canister filters air*

a. Canister is a cylindrical tin box which contains both mechanical and chemical filters.

b. Incoming air passes through rubber inlet valve attached to metal disk.

c. Mechanical filter of fibrous material stops any of the minute solid or liquid particles of which irritant smokes are composed.

d. Chemical filter is contained within small double-walled container of wire gauze or perforated tin. It is composed of granules of specially prepared and treated, highly porous carbon called activated carbon. Activated carbon attracts and holds the gases and allows the purified air to pass on into the facepiece. Granules of soda lime sometimes are mixed with the carbon to provide additional protection.

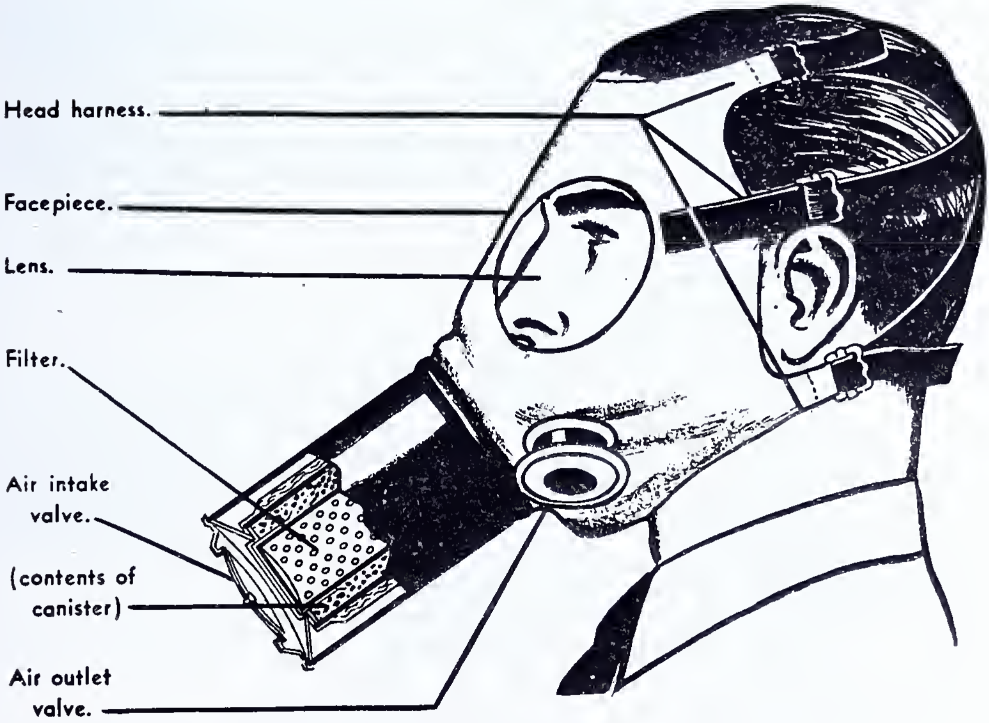


Figure 22. Noncombatant Gas Mask

e. Canister has active life of about 13 hours. After continued use it becomes saturated and will retain no more gas. It is then unserviceable and must be replaced. Under ordinary conditions, the canister will fail gradually; a seepage of gas can be detected by its odor and thus will give adequate warning.

3. *Carrier is convenient case and protects mask*

Consists of canvas bag with shoulder straps. The bag is designed to avoid crowding or creasing of the mask.

B. Care Needed in Using Mask

1. *Adjusting the gas mask*
   a. As soon as the odor of gas is detected, or upon hearing the gas alarm, hold the breath.
   b. Remove hat and eyeglasses.
   c. Place the left hand around the bottom of the carrier at the canister, open the cover flap with the right hand, and remove the mask.
   d. Bring the mask up in front of the face. Grasp the facepiece in both hands with the thumbs inside and below the lower head-harness strap and with the fingers on the outside of the facepiece. Open up the mask with the thumbs.
   e. Thrust the chin up and out. Put the mask over the chin and then over the rest of the face.
   f. Pull the head-harness down into position on the back of the head. Brush the hair back so that the mask will rest on the face; otherwise, gas may enter around the edges of the mask. Adjust the mask on the face. Men who are not clean-shaven may have difficulty making the mask gas-tight.
   g. Place the left hand over the outlet valve and exhale as strongly as possible, emptying the lungs. This important operation forces out any gas which may have been inside of the facepiece when it was put on.
   h. Start breathing normally.

2. *Adjusting the head-harness*
   a. Loosen the straps as much as possible.
   b. Put on the mask. Tighten the straps, making certain that the straps on opposite sides of the mask are tightened equally.
   c. Test for leakage by placing the palm of the hand lightly over the outlet valve on the bottom of the canister and breathing in. The facepiece should collapse on the face. If the fit is too loose, or if there is a hole in the facepiece or canister, air leakage will prevent the mask from collapsing on the face.
   d. Continue to tighten the straps until the fit is airtight, but not so tight that it will be uncomfortable.

3. *Testing for gas*
   a. Even though the "all clear" signal has been given, always test for gas before removing mask. To do this, first take a moderately full breath of air. Exhale partially, then hold the breath.
   b. Stoop down and bend forward so as to bring the head as close to the ground as possible, but do not lose balance or touch the ground with hands or knees.
   c. Insert two fingers of the right hand between the face and the facepiece of the cheek, thus permitting air to enter facepiece. Sniff gently but do not inhale deeply.
   d. Stand up again. If no gas was detected, remove mask. If gas was detected, clear mask as described in Paragraph 1g above.

4. *Removing the mask*
    - a. Grasp the canister just below the facepiece with the right hand.
    - b. Bend the head slightly forward and pull the mask outward and upward and off the head.
    - c. Hold the mask in the right hand and fold the head-harness inside.
    - d. Replace the mask in the carrier and close the flap.

C. MASK REQUIRES SPECIAL CARE

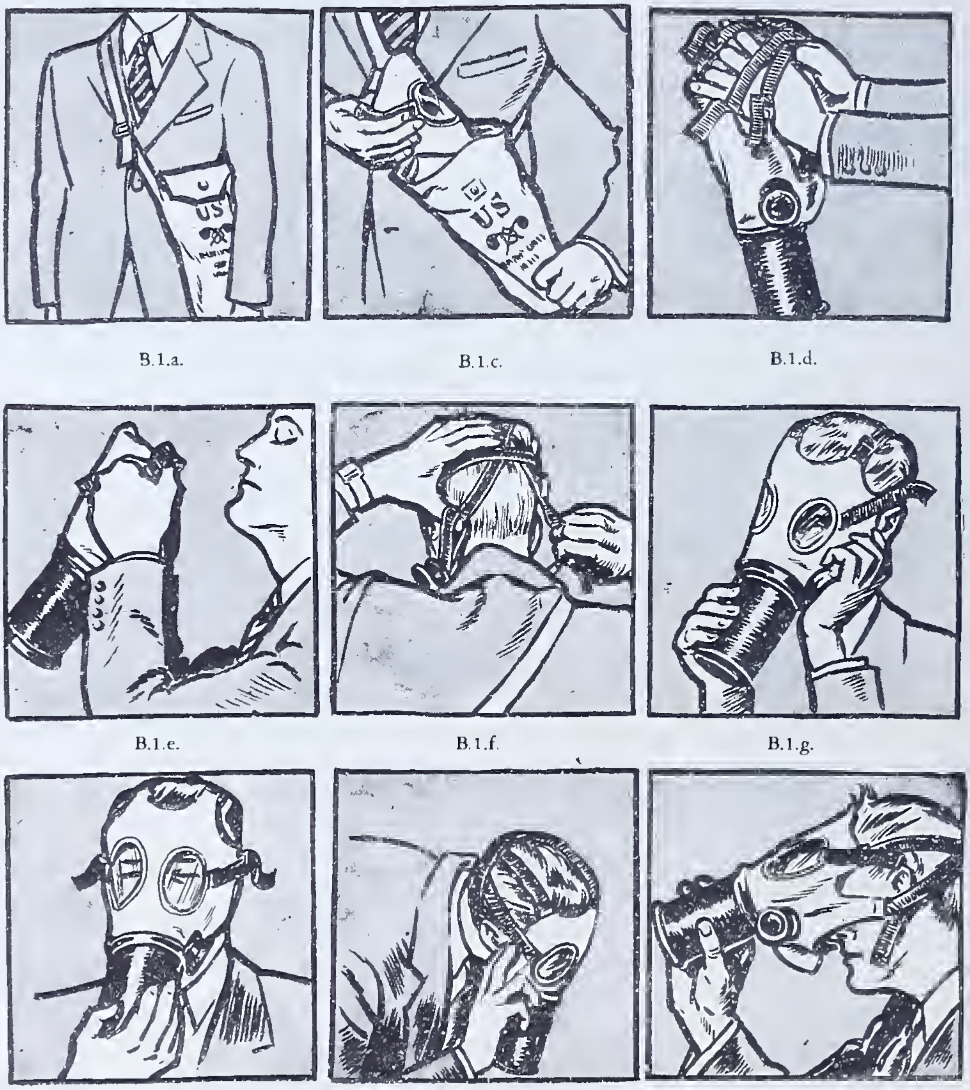
1. *Storing the mask*
    - a. Keep the mask in carrier when it is not in use.
    - b. Place nothing else in the carrier and do not put any weight upon it.
    - c. Keep the mask in a cool dry place. If the mask is worn during a rain, it must be dried before being replaced in the canister. If the canister becomes wet, it must be replaced at once.
    - d. Keep the mask handy and ready for use.
2. *Inspecting the mask*
    - a. Examine the facepiece carefully for pinholes, cracks, or tears by holding it up to a strong light. Examine the chin seam for rips or tears and the chin seam tape for any sign of failure. Stop any leaks at once with adhesive tape.
    - b. Examine the head-harness buckles for breakage and the straps for tears.
    - c. Examine the inlet and outlet valves. The rubber disks of the valves must not stick to the valve seat and they must retain their elasticity. If they have hardened, cracked or taken a permanent set, they must be replaced.
    - d. Examine the carrier for holes or other signs of wear.
3. *Disinfecting the mask*
    - a. Disinfect the mask periodically, and always when it is to be used by someone other than the original wearer.
    - b. Use a 3 percent solution of formaldehyde or a similar disinfectant.
    - c. Hold the mask upside down, with the canister above the facepiece, to prevent the disinfectant from getting into the canister.
    - d. Sponge the entire surface of the facepiece inside and out with a small clean rag saturated with the disinfectant.
    - e. Pour some of the disinfectant into the outlet valve. Drain excess liquid out by opening the valve.
    - f. Let the mask dry for 15 minutes in the air; then, wipe the inside of the facepiece with a clean dry cloth.

III. IDENTIFICATION OF CHEMICAL AGENTS

See Appendix A, Chemical Warfare Agents, Summary Chart.

REFERENCES:

Basic Field Manual; Defense Against Chemical Attack, U. S. War Department, 1940
Edgewood Lectures, Series III, "Gas Defense," OCD, 1941
Protection Against Gas, OCD, Dec. 1941



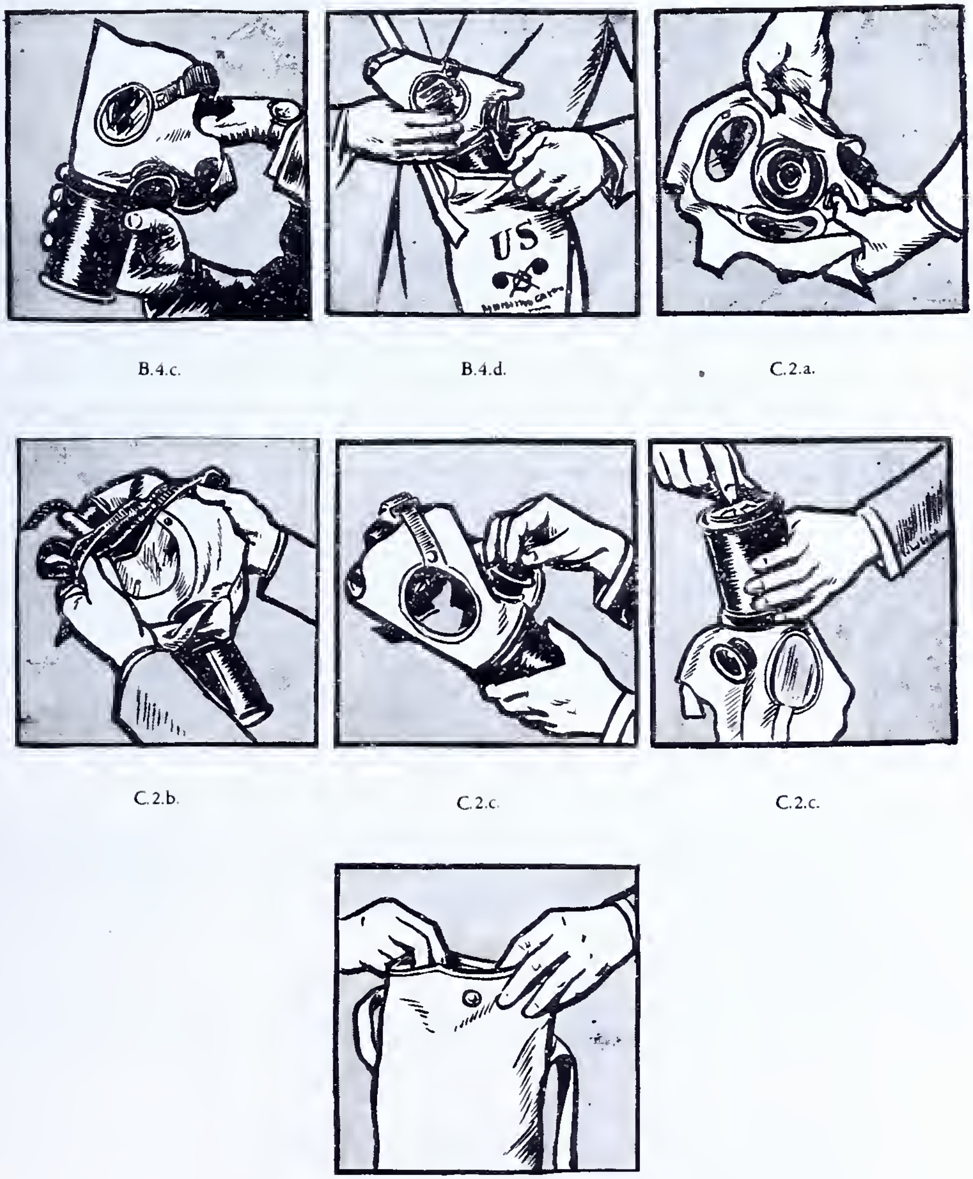
B.1.a. B.1.c. B.1.d.

B.1.e. B.1.f. B.1.g.

B.2.c. B.3.b. B.4.a.,b.

FIGURE 23. PUTTING ON, ADJUSTING, REMOVING AND INSPECTING GAS MASK

(Symbols below pictures refer to sections in the text.)



B.4.c. B.4.d. C.2.a.

C.2.b. C.2.c. C.2.c.

C.2.d.

FIGURE 23 (continued)

GAS DEFENSE B

Methods of Gas Defense

Unit VII—3 Hours

I. INTRODUCTION

A. NATURE OF CHEMICAL WARFARE

1. *Chemical warfare defined*
   Chemical warfare is a method of war in which substances are used for their direct chemical action to injure persons, or to produce screening smokes, or to set fire to combustible material. (This course will deal only with those gases used to cause bodily injury.)

2. *Chemical agents may be gases, liquids, or solids*
   Chemical agents are all referred to as "gases" because they can be disseminated in the atmosphere in the form of a cloud. The normal state of some chemical agents is gas, but they may be compressed and liquefied for loading into artillery shells, airplane bombs, or other containers. Upon release from their containers, these substances return to their normal gaseous state. Other chemical agents are normally liquids, but they vaporize quickly after their release to form a gas cloud. Still other chemical agents are solid materials but can be disseminated in the form of a smoke or dust cloud in the air by means of burning or explosive munitions.

B. USE OF GAS IS LIMITED

1. *Great quantities must be employed to be effective*
   a. Even in limited areas, great quantities of gas must be employed to be highly effective. Few nations have the resources in raw materials and manufacturing capacity to wage chemical warfare on an extensive scale.

   b. Despite the great increases in recent years in the cruising radius and carrying capacity of aircraft, the idea of a gas attack on such a scale as to wipe out the population of a large American city, or even a large proportion of it, is still regarded as fantastic.

2. *Wind, rain, air currents dissipate gas*
   a. While war gases vary in persistency, their persistency in all cases varies with different weather conditions and the physical features of the community which is attacked.

   b. In warm weather, gas evaporates faster, and hence, is less persistent and less effective than when the weather is cool.

   c. If there are winds or rising air currents, the gas will evaporate faster and be less persistent than when the air is comparatively still.

   d. The effects of gas will be more damaging in communities which are closely built than in those which are fairly open and in communities which are situated in low naturally-enclosed country than in those which are located in high country.

C. PREPAREDNESS REDUCES GAS DANGER

1. *Preparation discourages use of gas*

   It is essential for civilian protection that all be familiar with types of war gases and gas protection. Thorough preparation is the surest way to discourage the use of gas entirely or, if it is used, to reduce the number of casualties.

2. *Training reduces likelihood of panic*

   Panic during a gas attack will result in a heavy toll of gas casualties and incidental injuries and fatalities from falls, trampling, and traffic accidents. Training in protection against gas will overcome fear and avert panic. All should have a fair knowledge of war gases, their action upon the body, the means of detecting their presence, and first aid measures for those exposed to them.

D. DANGER DEPENDS ON PERSISTENCY AND CONCENTRATION

1. *Persistency varies among gases*
   - a. Chemical agents which are true gases and vaporize almost immediately upon release are quickly acted upon by wind and air currents. The gas mixes with the air and is diluted so that in a short time it disappears entirely. Such gases are said to be nonpersistent.
   - b. Chemical agents which are normally liquids vaporize slowly, giving off toxic vapors for a considerable period of time. They are called persistent gases.

2. *Concentration and exposure determine injury*
   - a. Concentration refers to the amount of the chemical which is present in a unit quantity of air. If the odor of gas is sharp and strong, an ordinary person will know that the concentration is high. The more poisonous gas present in the atmosphere, the more quickly and severely will one exposed to it be affected.
   - b. In the case of exposure to a war gas, the degree of injury depends both upon the concentration and the length of the period of exposure. A long exposure to a toxic gas in light concentration will tend to produce the same effect as brief exposure to the gas in high concentration.

II. TYPES OF WAR GASES

A. TYPICAL EXAMPLES ACCORDING TO PHYSIOLOGICAL ACTION

"Type agents" indicate the characteristics of their classes. Many thousands of chemical compounds have been studied by chemists to determine their possible value for chemical warfare. No attempt is made in this section to discuss all of the chemical agents in each group. Only those which may be called "type agents" or typical of the group to which they belong are considered in detail. In general, if one knows the characteristics of the type agent, he will know all he needs to know of all agents of that particular class.

Injuriousness is not the only characteristic a substance must possess to be suitable for war use. If the substance is to be used as a gas, the gas must be heavier than air so that it will tend to hug the ground. If the substance is normally a gas, it must be one which can be liquefied readily and so loaded into shells, bombs, or other containers. It must be available in large quantities and easily manufactured.

1. *Phosgene is typical of lung irritants*
   a. It is nonpersistent
   In open areas phosgene is easily dissipated within ten minutes after release. In low areas, especially in cool weather, it may accumulate and remain in effective concentrations for an hour or more. In cities, it accumulates in such places as areaways below the street level, cellars, etc.
   b. It can be detected by its characteristic odor
   In low concentration its odor is sweetish and rather pleasant; it is generally described as like that of green corn or new-mown hay. In high concentration the odor is less agreeable and somewhat like that of fermented fodder. Phosgene gas is normally colorless but in a cloud it may be perceptible. It appears whitish, like a thin smoke.
   c. Used in explosive shells or airplane bombs
   Phosgene may be used in explosive shells or airplane bombs. It is highly injurious only if breathed. The enemy would probably seek a surprise effect by producing an effective cloud quickly. For this reason phosgene attacks will probably come at night. Cool, cloudy weather favors the use of this type of gas; winds and rain are unfavorable for its use.
   d. It acts directly on the lungs
      (1) Phosgene causes the air cells of the lungs to fill with fluid from the body, thus retarding or stopping the normal process of respiration.
      (2) If the concentration is high, the effect is rapid after brief exposure; if low, the effects frequently are delayed.
      (3) Catching of the breath, coughing, and choking usually follow. Sometimes there is vomiting. These symptoms may disappear in a short time but may return later, usually within 24 hours in a more violent form. It also irritates the eyes, causing a flow of tears.
   e. It corrodes metals, contaminates food
   In high concentration, especially if moisture is present, it has a corrosive action on metals. Food exposed to it may be contaminated.

2. *Mustard gas is typical of blister gases*
   a. It is highly persistent
   Mustard gas is an oily, slowly-evaporating liquid. Its period of effectiveness after release varies from several hours to several weeks, depending on temperature, amount of the substance, and

method of use. It permeates any material which is at all porous, making it dangerous to touch.

b. It has odor of garlic

It has a characteristic odor much like that of garlic. After a time, however, the sense of smell is dulled to the odor and the presence of gas may not be noticed. As a liquid, mustard gas shows as brownish spots on vegetation and light-colored surfaces. As vapor it is invisible.

c. It irritates eyes, burns skin

(1) Even in low concentration, mustard gas has a serious effect upon the eyes, causing irritation and frequently temporary blindness.

(2) The vapor quickly penetrates ordinary clothing, causing skin burns, particularly at moist, delicate parts such as the armpits. A small droplet of mustard in liquid form will cause a severe burn. Unless a great amount of skin surface is affected, such wounds are rarely fatal unless infected, nor do they usually cause permanent injury.

(3) The casualty effect of mustard gas is delayed usually from four to six hours after exposure in the case of the vapor, and from one to two hours in the case of the liquid.

(4) Breathing of the vapor results in inflammation of the entire respiratory tract and makes the victim highly susceptible to pneumonia.

(5) The effects of Lewisite are somewhat similar, but its action is quicker and, unlike mustard gas, it is absorbed into the bodily system, producing arsenical poisoning.

e. It contaminates materials

Mustard gas and similar agents contaminate exposed materials and make them dangerous to touch.

3. *Adamsite is typical of irritant smokes*

a. It is nonpersistent

These gases sometimes called sneeze gases, are disseminated not as gases but in the form of a cloud of minute solid or liquid particles. Such clouds are nonpersistent. Adamsite is a solid material.

b. It has a temporary yellow color, no distinctive odor

Adamsite has no distinctive odor. It is sometimes compared in appearance to coal smoke or burning smokeless powder. The cloud given off from munitions containing Adamsite is canary yellow in color but it becomes invisible after traveling a few hundred yards.

c. It is used in "candles," shells, bombs

(1) Some irritant smokes are used in burning type munitions called "candles," others in shells or airplane bombs containing an explosive charge.

(2) An attack with gases of this type is usually followed by the use of a more deadly gas such as phosgene.

- d. It is effective in low concentration
  Irritant smokes are effective in very low concentration. The particles which make up the cloud will not penetrate a gas mask with a mechanical filter. However, brief exposure may cause such immediate distress that the victim is unable to adjust his gas mask or may be forced to remove his mask if he manages to put it on.
- e. It irritates nose and throat
  - (1) Irritant smokes irritate the nose and throat. Headache, nausea, and severe mental depression may result.
  - (2) Casualties are rarely fatal, but the victim may be incapacitated for 12 hours or more.

4. *Chloracetophenone is typical of tear gases*
   - a. Tear gases are effective in low concentration
     The principal effect of agents of this type is to irritate the eyes, causing a copious flow of tears. All are highly effective in low concentrations. Some are liquids, some solids.
   - b. Chloracetophenone is persistent as liquid, nonpersistent as gas
     - (1) Chloracetophenone is a solid crystalline substance which, when evaporated by applying heat, becomes an irritating gas which is nonpersistent.
     - (2) It may be dissolved in liquids and used in explosive bombs or in airplane spray apparatus. As a liquid it is persistent and more severe in its effects than as a gas.
   - c. It has sweet, pleasant odor
     It has a sweetish odor like that of apple blossoms. However, the action of the gas on the eyes is so rapid that frequently the odor is not detected in time.
   - d. It is used in shells, bombs, sprays
     Tear gases may be used in explosive shells and bombs and certain liquid types may also be sprayed from airplanes. Such gas may be employed alone or in conjunction with high explosives. It is used to harass, and if used against a city the purpose would be to cause confusion.

B. PRINCIPAL AGENTS MAY BE IDENTIFIED BY OBSERVATION

1. *Learn general rules for detecting gas*
   - a. A gas bomb makes a fainter and more muffled explosion than a high explosive bomb, and there is no bright flash of light as is produced by an incendiary bomb.
   - b. There usually is an odor and other noticeable effects of gas, such as pain in the eyes from tear gases and sneezing from irritant smokes.
   - c. Liquid gases form pools of dark brown oily liquid, and give to surfaces a many-colored sheen.
   - d. Special test paints and test papers can be used to detect mustard gas. Strips or squares of wood are painted with a special yellow paint; drops of liquid mustard produce red spots on the yellow paint, but vapor of mustard has no effect.

2. *Identify specific gas by odor, and other characteristics*

   Figure 24 shows those characteristics of the principal gases which are helpful in detecting the presence and type of gas.

3. *Sniff sets may be used for training in identification*

   a. Small samples of actual war gases can be used for training in gas identification. The following rules apply:
      (1) Memorize the odors and associate them with the gases.
      (2) Before starting the test, take a deep breath of uncontaminated air. Exhale a portion.
      (3) Sniff once and attempt to associate the odor with one of the known war gases.
      (4) Exhale and clear the nasal passages of the gas.
      (5) Do not repeat the test for several minutes. Repeated testing for some gases such as mustard will dull accurate identification.
      (6) Do not smoke while learning the odors or at any time while testing for gas. Smoking dulls the sense of smell.

   b. The army uses a sniff set consisting of seven 4-ounce glass bottles for instruction in gas identification. These bottles contain mustard gas (2 bottles), Lewisite, Adamsite, chlorpicrin, phosgene, and the tear gas chloracetophenone. The gas is absorbed by charcoal and is given off gradually when the stopper of the bottle is removed. It is important that sniff sets be used correctly:
      (1) Shake the bottle gently.
      (2) Remove stoppers carefully. If the sets have not been used for a while it is suggested that a gas mask be worn when opening the bottles because sufficient pressure may be built up to throw out some of the contents when stoppers are removed.
      (3) Pass the stopper under the nose and sniff gently. If the odor is too faint to recognize, hold the stopper under the nose for a few seconds.
      (4) If this fails, pass the mouth of the bottle under the nose, sniff *gently*, but *do not hold it there.*

III. COLLECTIVE PROTECTION AGAINST GAS

A. CONSISTS OF ALARMS, SHELTERS, DECONTAMINATION, FOOD AND WATER PROTECTION

Collective protection consists of measures for the protection of a number of persons as a group. It is distinguished from individual protection which refers to the use of gas masks and gas protective clothing. Collective protection measures consist of gas alarms, gas-proof shelters, decontamination equipment and procedure, and protection of food and water.

PRINCIPAL CHARACTERISTICS OF POISON GASES

Chemical Agent	Symbol*	Type	Form	Odor	Color	Persistency
CHLORINE	Cl	Lung Irritant	Gas	Pungent	Green-Yellow	10 min.
PHOSGENE	CG	Lung Irritant	Gas	Musty hay, green corn	First white, then colorless	10-30 min.
CHLORPICRIN	PS	Lung Irritant	Oily liquid changing slowly in open to gas	Sweetish-Flypaper, anise	Colorless as gas	Open—6 hours; woods—12 hours
MUSTARD	HS	Blister Gas (Vesicant)	Liquid changing slowly into gas	Garlic or horseradish	Dark brown as liquid; colorless as gas	1 day to 1 week. Longer if dry or cold
LEWISITE	MI	Blister Gas (Vesicant)	Liquid changing slowly into gas	Geraniums	Dark brown as liquid; colorless as gas	1 day to 1 week. Longer if dry or cold
CHLORACETO-PHENONE	CN	Tear Gas (Lacrimator)	Gas	Apple blossoms	Bluish Grey	10 min.
BROMBENZYL-CYANIDE	CA	Tear Gas (Lacrimator)	Gas	Sour fruit	Brownish	Several days; weeks in winter
DIPHENYL-CHLORARSINE	DA	Irritant Smoke	Smoke	Shoe polish	Greyish	10 min.
ADAMSITE	DM	Irritant Smoke	Smoke	Coal smoke	Yellow	10 min.

*Chemical Warfare Service Symbols.

Chemical Agent	Effects on Persons	Action on Food and Water	Action on Metal
CHLORINE	Begin immediately. Choking and coughing; smarting of eyes.	Contaminates. Removable by ventilation and heating but taste remains disagreeable.	Dry, none; wet, vigorous corrosion.
PHOSGENE	Begin immediately but progress slowly. Irritation of lungs, occasional vomiting, tears in eyes, doped feeling. Later collapse and heart failure.	Contaminates. Removable by ventilation and heating but taste remains disagreeable.	Dry, none; wet, vigorous corrosion.
CHLORPICRIN	Coughing, tears in eyes, nausea, vomiting, lung irritation.	Contaminates. Removable by ventilation and heating but taste remains disagreeable.	Slight tarnish.
MUSTARD	Delayed effect. Burns skin or membrane. Eye irritation. Inflammation of respiratory tract, leading to pneumonia.	Renders unfit for use.	Very slight.
LEWISITE	Skin irritation in 15 min., discoloration and blisters in 30 min. to 1 hour. Lung irritation, eye irritation, vomiting. Arsenical poisoning.	Poisons. Cannot be made useable.	Very slight.
CHLORACETO-PHENONE	Makes eyes smart. Tears flow. Eyes shut tightly. Temporary.	Gives disagreeable odor.	Tarnishes steel slightly.
BROMBENZYL-CYANIDE	Eyes smart, shut, tears flow. Effect lasts some time. Headache.		
DIPHENYL-CHLORARSINE	Immediate effect. Sneezing and burning sensation of throat and nose. Nausea, headache, temporary debility.	Poisons. Cannot be made useable.	Vigorous corrosion on steel.
ADAMSITE	Immediate effect. Sneezing, headache, nausea, vomiting, temporary debility. In low concentrations, effect delayed 5 to 10 min.	Poisons. Cannot be made useable.	Very slight.

FIGURE 24

B. GAS ALARMS WARN OF GAS ATTACK

1. *Gas warnings are local*
    - a. No official system for warning civilians of gas attacks has been formulated. Until special gas warning signals are designated, all air raid warnings should be considered warnings of potential gas attacks.
    - b. Ordinarily only one or more sections of a city or a defense region will be affected by gas attacks. While everyone should be on the alert, people in areas some distance from those which are gassed may not have to make immediate anti-gas preparations.
    - c. Gas alarm systems will be such that people in each section may be given warning in proper time in case their section is attacked directly or is endangered by gas drifting or being blown from another section. This requires a highly coordinated alarm organization for gas detection and rapid communication.
2. *Gas alarms must be distinctive*

    The gas alarm should be distinguishable from the regular air raid warning and loud enough to be heard throughout the gas alarm area, but not so loud that it will alert surrounding areas. In a large city, a large number of such alarms may be necessary. Church bells, horns, or rattles may be used.

C. GAS-PROOF SHELTERS MUST BE AIR-TIGHT

1. *Shelters are necessary in homes, public buildings, business establishments*
    - a. A gas-proof shelter is an enclosure sealed to prevent gas from entering or provided with equipment to remove gases from the air. If a gas attack upon a community is prolonged, or if a persistent gas is used, such shelters may be necessary for long periods of occupancy.
    - b. Gas-proof shelters may be non-ventilated or ventilated
        - (1) Nonventilated—A room, cellar, or other enclosure, sealed to prevent air contaminated with gas from entering. Such shelters can be occupied for only a limited time, depending on the size and the number of persons occupying it.
        - (2) Ventilated—An enclosure made gas-tight and equipped with apparatus to draw in outside air through a canister which removes gas. Such shelters can be occupied so long as the canister is effective.
2. *Home shelters may be improvised*
    - a. First floor or basement is best

        The preferred location for home shelters is the first floor or basement. Even so, the blast from high explosives may shatter windows and otherwise interfere with gas-proofing measures.
    - b. Householders take the following measures
        - (1) Keep gas-proofing materials ready at hand.
        - (2) In planning a shelter, provide two exits. An air-lock doorway should lead into the shelter. A short passageway

with the openings at each end covered by oil cloth or a blanket will serve as an air-lock.

(3) Make the room gas-tight by sealing *all* openings, including keyholes, floor cracks, holes around pipes, trap-door and chimney openings. Oil cloth, coated fabrics, celluloid, or other non-porous materials may be used. Dampened blankets may be tacked over window frames. Extinguish all fires.

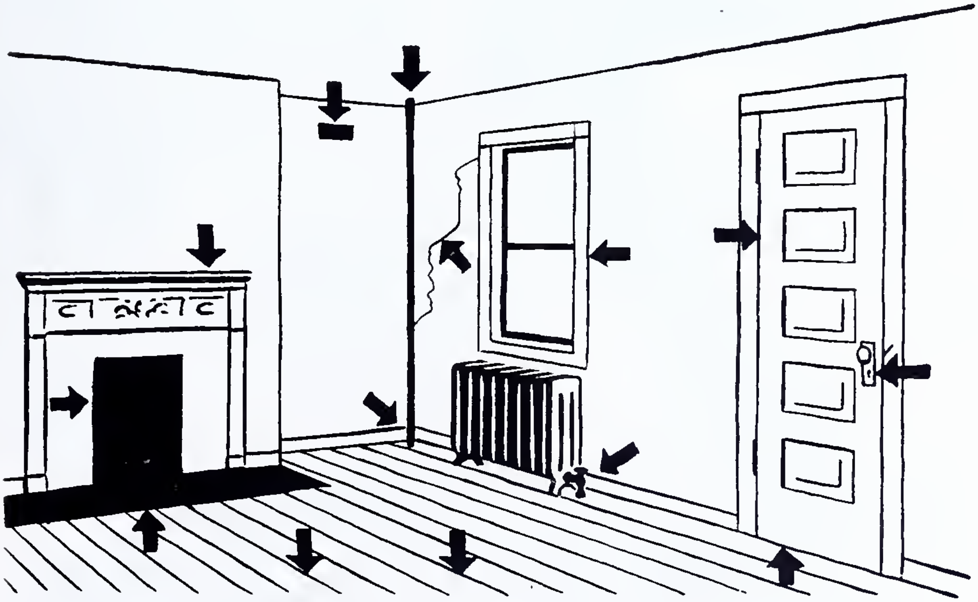
3. *Special non-ventilated shelters may be constructed*

Proprietors of hotels, public buildings, department stores and the like may desire to construct special gas shelters to accommodate their employes or patrons. In such cases, the following specifications would apply.

a. Allow twenty square feet of floor space for each occupant. If the ceiling is of normal height (eight to ten feet), there will be sufficient air for continuous occupancy of about ten hours. Thus, a room ten feet square will accommodate five persons.

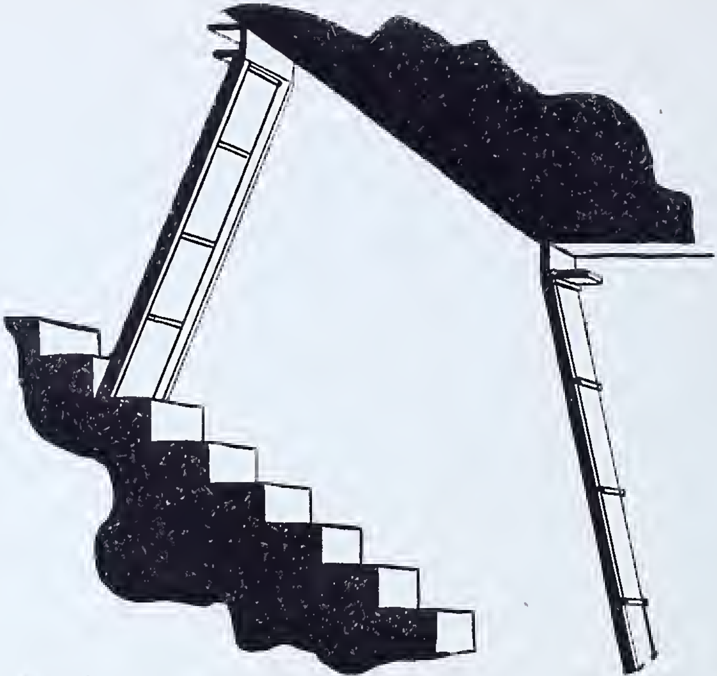
b. Walls and ceiling must be constructed of concrete at least 12 inches thick not lined with steel or waterproofed since this affects the absorption of carbon dioxide and reduces the maximum limit of occupancy to five or six hours.

c. The use of an electric fan and of cotton bags filled with activated charcoal and soda lime is helpful.

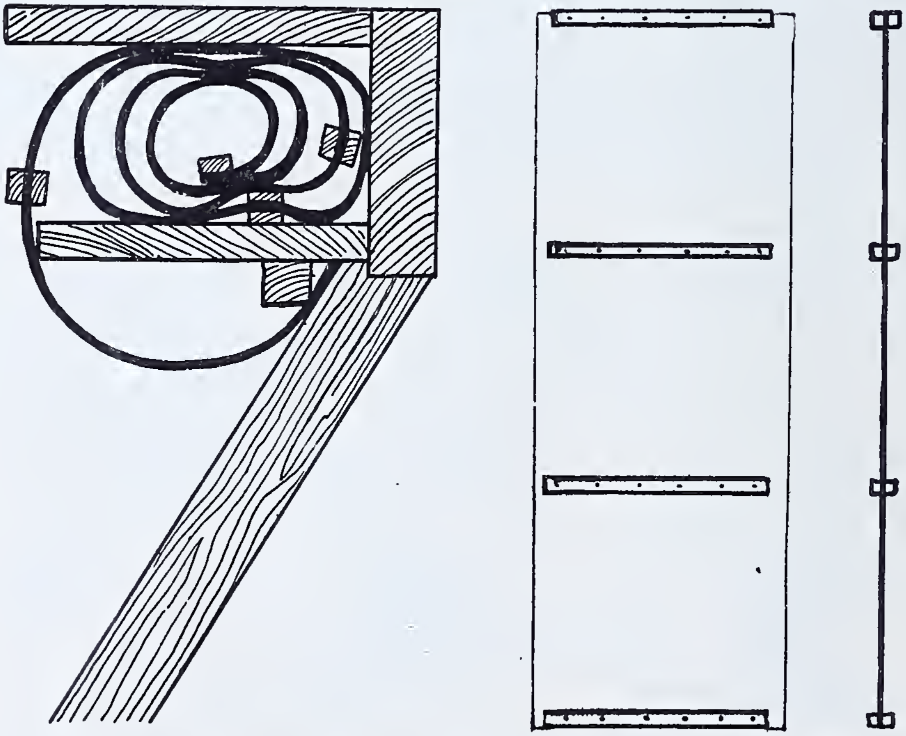


All cracks and openings should be sealed to gasproof a room. Arrows show where to look for cracks and leaks.

Figure 25. Gasproofing Refuge Room



Air-lock doorway leading down to shelter opening at each end is covered with blanket.



Shelf detail: Cross-section showing how blanket is stored when not in use. Heavy black line represents edge of blanket.

Blanket detail: Strips of wood nailed across top and bottom of blanket and at points between; top of blanket nailed to doorframe. Side view at extreme right.

FIGURE 26. AIR-LOCK DOORWAY FOR GASPROOF SHELTER

4. *Ventilated shelters are necessary for prolonged occupancy*
   a. If a gas-proof shelter is to be occupied for more than ten hours, or if a smaller volume of air space than is provided by five square feet of floor space per person is to be allowed, mechanical ventilation is necessary.
   b. Thirty-three cubic feet of air per hour per person must be supplied so that the carbon dioxide concentration shall not exceed the maximum of two percent.
   c. The apparatus used to provide fresh air is called a "collective protector." It consists of a large canister or battery of canisters similar in construction to a gas mask canister, and a suction fan operated either by hand power or motor. This apparatus filters out or absorbs gas or irritant smoke.
   d. The air intake should be as high above ground level as possible. It is good practice to provide dual air intakes.
5. *Shelters should have sufficient equipment and supplies*
   Supplies and equipment must be placed in the shelter in advance, since there will be little time to collect them after the gas alert has sounded. Include the following:
   a. Water in containers for drinking, washing, soaking towels, and caulking.
   b. Food in containers; simple packaged foods, thermos bottles of coffee, milk, etc.
   c. Caulking materials and tools, including newspapers, scotch tape, claw hammer, nails, etc.
   d. Radio: battery-operated, if possible.
   e. Flashlight with extra bulbs and batteries.
   f. Toilet facilities: chemical type or simple container with tight cover.

D. DECONTAMINATION IS SPECIALIZED TASK
1. *Decontamination squads perform this job*
   Specially trained decontamination squads, provided with protective clothing and equipment, are responsible for decontamination work.
2. *Several decontamination methods may be used*
   a. Destroying the gas by the use of other chemicals or by burning.
   b. Removing the gas by washing it away.
   c. Sealing gas-contaminated places.

E. FOOD AND WATER MAY BE PROTECTED FROM CONTAMINATION
1. *Food is contaminated easily*
   Food may be contaminated either by direct contact with chemical agents in liquid or solid form or by exposure to the vapor. Fatty and oily substances, such as meats and butter, and also meals and flour, are quickly contaminated. Green vegetables are less easily affected.
2. *Decontamination of food is impracticable*
   All known means of decontaminating food—by use of chemicals, by ventilation, or by boiling—destroy the taste of food or impair its value. Food contaminated by mustard, Lewisite, or irritant smokes cannot even be made safe.

3. *Food can be sealed against gas penetration*
    - a. If danger from gas is imminent, measures should be taken to seal food in gas-tight containers or storage rooms.
    - b. Canned or bottled goods exposed to gas can be used if the container is immersed in boiling water before being opened.
    - c. Food which is not sealed in cans or bottles can be carefully wrapped in some impervious material, such as cellophane. Waxed paper gives protection against *gas* vapors but only limited protection against *liquid* chemical agents.
4. *Contamination of water supplies is unlikely*
    - a. The pollution of water supplies to the degree that harmful results could follow would require such large quantities of gases that it is considered improbable. Moreover, gases would be removed by modern water treatment processes.
    - b. Wells and cisterns which have been exposed to gas should not be used until the health authorities have declared them safe.

IV. FIRST AID FOR GAS CASUALTIES

A. First Steps Apply to All Gas Casualties
1. Put a gas mask on the victim.
2. Remove the victim from contaminated atmosphere.
3. Get the victim to a decontamination station or first aid post as soon as possible.

B. Lung Irritants
1. Effects and Symptoms: water-logged lungs (pulmonary edema), circulatory collapse, latent period—12 to 24 hours, rapid breathing, bluish color, strangling cough.
2. Treatment: keep patient quiet, keep patient warm, do not give artificial respiration, give oxygen, if possible.

C. Blister Gases
1. Special characteristics: may persist for days, penetrates materials and human skin, action is delayed.
2. Mustard gas
    - a. Effects and symptoms: eyes smart, redden, swell; skin itches, reddens, blisters; hoarseness, cough, bronchopneumonia.
    - b. Treatment
        - (1) Medical unit personnel must protect themselves.
        - (2) Give immediate treatment.
        - (3) Remove and decontaminate contaminated clothing.
        - (4) Apply dry pads to absorb mustard.
        - (5) Dab affected area with sponges dampened with gasoline, kerosene, or alcohol.
        - (6) Scrub skin with soap and water.
        - (7) Pat area dry with towel.
        - (8) Burn or bury contaminated materials.
        - (9) Irrigate eyes, rinse nose and throat with baking soda solution.
        - (10) Treat severe burn surgically.
3. Lewisite
    - a. Effects and symptoms: eyes pain, may lose vision; skin reddens,

blisters; muscle or other body tissue may be penetrated; throat becomes dry and sore; diarrhea may result; paralysis develops in severe cases.

- b. Treatment
  - (1) Medical unit personnel must protect themselves.
  - (2) Rinse eyes immediately with 2% hydrogene peroxide.
  - (3) Remove contaminated clothing.
  - (4) Swab contaminated areas immediately with hydrogen peroxide or other solution.
  - (5) Give immediate medical attention.
  - (6) Burn or bury contaminated materials.

D. IRRITANT SMOKES

- a. Effects and Symptoms: nose and sinuses full; violent sneezing; throat sore, chest pains; eyes water; nausea and vomiting may occur; headache and mental depression may occur.
- b. Treatment
  - (1) Remove to pure air.
  - (2) Make patient inhale dilute chlorine.
  - (3) Treat headache.

E. TEAR GASES

- a. Effects and symptoms: eyes sensitive to light, unable to open, water; skin may break out in mild rash; vomiting may occur.
- b. Treatment
  - (1) Remove to pure air.
  - (2) Face wind with open eyes.
  - (3) Irrigate eyes with boric acid or baking soda solution.
  - (4) Do not rub or bandage eyes.

F. INCENDIARIES—WHITE PHOSPHORUS

1. Effects: particles stick to skin and burn.
2. Treatment
   - a. Keep burn wet.
   - b. Squeeze or pick particles out with forceps.
   - c. If no water, apply 5% to 15% solution of copper sulphate.
   - d. Once particles are removed, treat as any burn.

REFERENCES:

Air Raids: What You Must Know, What You Must Do, British Ministry of Home Security, Sept. 1941.

Basic Field Manual: Defense Against Chemical Attack, U. S. War Department, 1940.

Basic Training In Air Raid Precautions, ARP Training Manual No. 1, British Stationery Office, 1941.

Edgewood Lectures, Series III, "Gas Defense," OCD, 1941.

First Aid Text-Book, Supplement No. 2 on war gases, American Red Cross, 1940.

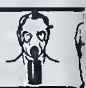
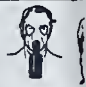
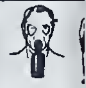
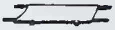
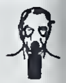
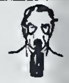
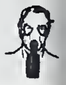
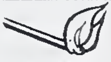
Instruction Manual for Air Raid Wardens, Phila. Police College and Institute of Local and State Government, University of Pennsylvania, January 1942.

Protection Against Gas, OCD, Dec. 1941.

APPENDICES

REFERENCE AND TRAINING CHART

CHEMICAL WA

CLASS	NAMES AND SYMBOLS	FORM	ODOR	PHYSIOLOGICAL EFFECT	TACTICAL CLASS	PROTECTI
VESICANTS	**MUSTARD** $S(CH_2CH_2)_2Cl_2$ DI-CHLORETHYL SULFIDE	LIQUID AND VAPOR	Garlic, Horseradish, Mustard	Delayed effect. Burns skin or membrane. Inflammation respiratory tract leading to pneumonia. Eye irritation, conjunctivitis.		
	LEWISITE $CHClCH$-$AsCl_2$ CHLORVINYL-DICHLORARSINE	LIQUID AND VAPOR	Geraniums	Burning or irritation of eyes, nasal passages, respiratory tract, skin: Arsenical poison.		
	ETHYLDICHLORARSINE C_2H_5-$AsCl_2$	LIQUID AND VAPOR OR GAS	Stinging, like pepper in nose	Causes blisters, sores, paralysis of hands, vomiting. Severe on long exposure.		
LUNG IRRITANTS	**CHLORINE** Cl_2	GAS	Highly Pungent	Lung irritant.		
	CHLORPICRIN CCl_3NO_2 NITROCHLOROFORM	GAS	Flypaper, anise	Causes severe coughing, crying, vomiting.		
	DIPHOSGENE $ClCOOC$-Cl_3 TRICHLORMETHYL CHLOROFORMATE	GAS	Ensilage, Acrid	Causes coughing, breathing hurts, eyes water, toxic.		
	PHOSGENE $COCl_2$ CARBONYL CHLORIDE	GAS	Musty hay, Green corn	Irritation of lungs, occasional vomiting, tears in eyes, doped feeling. Occasionally symptoms delayed. Later, collapse, heart failure.		
LACRIMATORS	**CLORACETOPHENONE** C_6H_5CO-CH_2Cl	GAS	Apple Blossoms	Makes eyes smart. Shut tightly. Tears flow. Temporary.		
	BROMBENZYLCYANIDE C_6H_5CH-$BrCN$	GAS	Sour fruit	Eyes smart, shut, tears flow. Effect lasts some time. Headache.		
STERNUTATORS	**ADAMSITE** $(C_2H_4)_2$-$NHAsCl$ DIPHENYLAMINECHLORARSINE	GAS	Coal Smoke	Causes sneezing, sick depressed feeling, headache.		
	DIPHENYLCHLORARSINE $(C_6H_5)_2$-$AsCl$	SMOKE	Shoe Polish	Causes sick feeling and headache.		
SMOKES	**H C MIXTURE** $ZN + C_2Cl_6$	SMOKE	Sharp-Acrid	Harmless.		None needed.
	SULPHUR TRIOXIDE SO_3 - SO_3HCl IN CHLORSULFONIC ACID	SMOKE	Burning matches	Causes prickling of skin, flow of tears.		
	TITANIUMTETRACHLORIDE $TiCl_4$	SMOKE	Acrid	Harmless.		None needed.
INCENDIARIES	**WHITE PHOSPHORUS** P	SMOKE	 Burning matches	Burning pieces adhere to skin, clothing.		None needed.
	THERMIT $8Al + 3FeO_4$	INCENDIARY	None	5,000 degree heat ignites materials.		None needed.

RE AGENTS

PREPARED BY OFFICE OF CIVILIAN DEFENSE

FIRST AID [After removal from gassed area]	PERSISTENCE	FIELD NEUTRALIZATION
; remove liquid mustard with protective t, bleach paste, or kerosene; ash eyes and nose with soda solution.	One day to one week. Longer it dry or cold.	Cover with unslaked lime and earth. 3% solution of Na_2SO_3.
; remove liquid Lewisite with hydrogen e, lye in glycerine, or kerosene; bathe; es and nose with soda. Rest—Doctor.	One day to one week. Longer il dry or cold.	Wash down with water. Cover with earth. Alcohol. NaOH spray.
s; remove liquid with hydrogen peroxide, glycerine, or kerosene; bathe; wash eyes se with soda. Rest—Doctor.	One hour.	Cover with earth, caustic.
from gassed area. Keep quiet and warm. as stimulant.	10 minutes.	Alkaline solution.
yes, keep quiet and warm. Do not use s.	Open 6 hours. Woods 12 hours.	$NaSO_3$—Sodium sulfite in alcohol solution.
quiet and warm. Give coffee as a stimulant.	30 minutes.	Alkali.
et and warm, bed rest. Coffee as a t. Loosen clothing. No alcohol or cigarettes.	10 to 30 minutes.	Alkali.
yes with cold water or boric acid solution. bandage. Face wind. For skin, sodium solution.	10 minutes.	Strong, hot solution of sodium carbonate.
eyes with boric acid. Do not bandage.	Several days. (Weeks in winter.)	Alcoholic sodium hydroxide spray.
et and warm. Loosen clothing. Reassure. se with neo-synephrin or sniff bleaching Aspirin for headache.	10 minutes.	Bleaching powder solution.
to pure air, keep quiet. Sniff chlorine aching powder bottle.	Summer 10 minutes.	Bleaching powder solution.
oduces no effect requiring treatment.	While burning.	None needed.
Wash with soda solution.	5 to 10 minutes.	Alkaline solution.
oduces no effect requiring treatment.	10 minutes.	None needed.
cloths wet with copper sulphate (blue vitriol) or immerse in water. Pick or squeeze out . Treat for burn.	10 minutes.	Burns out.
Treat for severe burn.	5 minutes.	Quickly cover with earth or sand.

GENERAL INSTRUCTIONS

The importance of proper first aid for gas victims cannot be overemphasized. The following are general rules which apply in all cases.

A. Act promptly and quietly; be calm.

B. Put a gas mask on the patient if gas is still present or, if he has a mask on, check to see that his is properly adjusted. If a mask is not available, wet a handkerchief or other cloth and have him breathe through it.

C. Keep the patient at absolute rest; loosen clothing to facilitate breathing.

D. Remove the patient to a gas-free place as soon as possible.

E. Summon medical aid promptly; if possible, send the victim to a hospital.

F. Do not permit the patient to smoke, as this causes coughing and, hence, exertion.

KEY

HOSPITAL CASE

FIRST AID TREATMENT

SMOKE

INCENDIARY

MASK PROTECTION NEEDED

FULL PROTECTIVE CLOTHING NEEDED

BASIC REQUIREMENTS FOR ARMBAND CERTIFICATION CITIZENS' DEFENSE CORPS UNITS

BASIC COURSES	Hours Required	Total Number of Units	Staff	Messengers	Drivers[1]	Auxiliary Firemen	Rescue Squads	Auxiliary Police	Bomb Squads	Air Raid Wardens	Fire Watchers	Emergency Food & Housing Corps	Medical Corps[1]	Nurses' Aides[1]	Demolition & Clearance Crews	Road Repair Crews	Decontamination Squads	Utilities Repair Crews
General Course	5	16	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Fire Defense A	3	9	●	●		●	●	●		●	●				●	●		
Fire Defense B	7	2				●	●											
Gas Defense A	2	15	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●
Gas Defense B	3	6			●		●	●	●	●							●	
First Aid (10 Hours)	10[2]	9	●	●	●	●		●	●	●				●			●	
First Aid (20 Hours)	20	2					●						●					
Number of Courses			4	4	4	5	6	5	3	5	3	2	3	3	3	3	4	2
Number of Hours			20	20	20	27	40	23	18	23	10	7	27	17	10	10	20	7

[1] Additional specialized courses are required as part of the basic training for drivers, the medical corps and nurses' aides.
[2] If the ten-hour course is not offered, the twenty-hour course must be taken.
Note: Close-order drill is optional.

APPENDIX C

NOTES ON FIRST AID

Emergency medical units are being organized in communities to care for air raid casualties. However, there may be occasions when their services are not immediately available and the need for elementary first aid treatment is urgent. Accordingly, the members of eleven Citizens' Defense Corps units are required to take the American Red Cross first aid course for civilian defense. These notes are intended to serve for review purposes. All Citizens' Defense Corps members who are required to take the American Red Cross first aid course are urged to obtain a copy of the OCD *Handbook of First Aid.*

LESSON I—GENERAL, CARE OF WOUNDS

A. Primary Consideration in First Aid

1. To save life, if it is immediately endangered, by taking the correct action at once.
2. To prevent further injury, especially damage due to injudicious movement or clumsy and incorrect handling.
3. To relieve pain and counteract shock.

B. General Principles Apply for All Injuries

The immediate action required is governed by the particular circumstances, and it is not possible to lay down a procedure which would always apply. However, there are certain general principles which cover all casualties.

1. The casualty should be removed from any source of immediate danger.
2. Severe bleeding should be attended to at the earliest possible moment. This does not mean that every cut or wound should have prior attention. The rule applies to profuse bleeding.
3. Difficult breathing must be remedied, and artificial respiration, if needed, must be started promptly and maintained.
4. In cases of even suspected fracture of bones, the affected part should be supported and secured by simple methods before the casualty is moved, unless his life is in immediate danger.
5. In all casualties, shock will be marked. Extreme gentleness and smoothness in handling and moving the patient are essential.
6. When a casualty has several injuries, treat the most serious first.

C. Mark Patient for Treatment Given

When first aid treatment is given, it may be essential for the person next handling the case (at a hospital or first aid station) to know about it. Therefore, some indication of the treatment given, or special kind of injury is necessary. Identification tags should be attached to the victim's clothing, or markings made on his forehead.

The symbols to be used are:

T, for tourniquet
M, for morphine
H, for hemorrhage
X, for wound of chest or abdomen
C, for gas contamination

D. First Aid Kits Supplied

A belt type kit containing dressings, cravat bandages, and identification tags, is to be supplied to Air Raid Wardens, Rescue Squads and certain other enrolled groups. The belt should be worn at all times when the worker is on duty.

E. Give Minimum Treatment for Wounds

1. *General rules apply to most wounds*

   The chief dangers of wounds are severe bleeding, the introduction of infection, and the development of shock.

   a. Make no attempt to clean or wash the wound.
   b. Do not apply an antiseptic, disinfectant, or salve.
   c. Cover the wound with sterile gauze, fix it in place with bandage or adhesive tape, and take victim to the doctor.
   d. Direct persons with minor injuries to a casualty station.
   e. Transport persons with serious injuries by stretcher or ambulance to a first aid post or hospital.
   f. Treat casualties with wounds in the body, no matter how small, as for internal injuries.

2. *Apply a sterile compress to head wounds*

   a. If there is a wound of the scalp, apply a sterile compress to the wound and hold it in place with a firmly applied bandage.
   b. If there is a bloody or watery discharge from the ears, do not plug them with cotton, and do not try to clean them. Merely apply a sterile dressing over the ears.
   c. Treat the victim for shock.
   d. Keep the victim warm and quiet. Keep him lying down, with his head slightly elevated.
   e. Transport victim to the hospital on a stretcher.

3. *Use special care in internal injury cases*

   a. Treat for shock; keep victim warm.
   b. Never give anything to drink.
   c. If injury is in abdomen, keep victim lying down, but if it is in his chest, prop up his head and shoulders.
   d. Do not attempt to replace protruding organs.
   e. Transport the victim on a stretcher to a hospital as soon as possible.

4. *Bandage facial wounds*

   a. If tongue has fallen into the back of the throat, grasp it in the fingers and pull it forward. Apply a chin bandage.
   b. Apply a number of sterile gauze dressings to the wound and bind in place with a triangle bandage.

F. SEVERAL TYPES OF BANDAGES ARE USED

1. *Bandage compress*
   - a. This is a piece of gauze attached to the center of a strip of bandage. Open the compress without touching the inside, place it over the wound and bind in place by the bandage tails.
   - b. When a bandage compress is not available, use a sterile gauze pad and bind it in place with bandage, or short strips of adhesive plaster.

2. *Triangle bandage*
   - a. It may be used:
     - (1) As an open triangle spread out to its full extent.
     - (2) As a wide folded bandage (wide cravat). Carry the point (opposite the longest edge) to the middle of the longest edge, and then fold bandage again in the same direction.
     - (3) As a narrow folded bandage (cravat). Fold the wide cravat bandage once more, long edge to long edge.
   - b. It may be used to keep splints or dressings in position, as a sling to support an injured part, or as a tourniquet.

3. *Slings*
   - a. The large arm sling is used to support the forearm and hand.
   - b. Spread out a triangle bandage on the front of the patient with the point toward the injured arm. Pass the upper end around the back of the neck, from the sound side, so that it appears over the shoulder of the injured side. Carry the point behind the elbow of the injured arm; place the forearm across the middle of the bandage. Then, carry the lower end up around the arm and tie to the upper end.
   - c. Slings may be improvised
     - (1) By pinning a coat sleeve to the front of the coat.
     - (2) By turning up the lower edge of a coat and pinning it to the front of the coat, or
     - (3) By passing the hand inside the coat and then buttoning it.

LESSON II—BLEEDING, BURNS

A. PROFUSE BLEEDING MUST BE STOPPED IMMEDIATELY

Loss of blood is one of the main causes of both primary and secondary shock. Profuse bleeding from a large artery, or the continued oozing of blood from an extensive area of the body may lead to collapse and finally to death.

1. *Hemorrhage may be external or internal*
   - a. In external hemorrhage, the blood is visible externally; the source of the blood is evident, and the bleeding is from vessels in the limbs or relatively near the surface.
   - b. In internal hemorrhage, bleeding is from vessels inside the body, and the blood escapes into internal organs or cavities of the chest or abdomen. It is not visible externally, unless it is coughed up, or vomited.

2. *Symptoms are easily identified*

   In the case of external hemorrhage, bleeding is evident. Other signs and symptoms of severe uncontrolled bleeding, either external or internal, are as follows:

   a. Rapid loss of strength, accompanied by giddiness and faintness, especially if the patient is raised to a sitting or standing position.
   b. Face and lips become pallid, and the skin cold and clammy.
   c. Breathing is hurried and labored, and may be accompanied by yawning and sighing.
   d. Pulse quickly becomes weak and rapid so as not to be felt at the wrist.
   e. Patient becomes thirsty.
   f. Patient may become wholly unconscious.

3. *Patient should be treated quickly or removed to hospital*

   a. External hemorrhage—bandage wound
      (1) Adjust patient's position. Blood escapes with less force if he is sitting, or better, lying.
      (2) Elevate the bleeding part, except in the case of a fractured limb.
      (3) Check bleeding normally by firm, even bandaging. If there is a fracture or imbedded foreign body, bandage lightly. Do not touch surface of gauze, or bandage, to be placed over the wound.
      (4) In exceptional cases, when large arteries are involved, or when a foreign body is imbedded in the wound, press firmly with the cushions of the fingers or thumb against the nearest pressure point between the wound and the heart. Pressure points are those places at which the beat of an artery can be felt, and at which the application of finger pressure will compress the artery against a bone and stop the flow of blood. Apply a tourniquet at the pressure point, but *loosen it at intervals of not more than 15 minutes.*
      (5) In the case of a severely lacerated limb, bandage over a splint, even though no fracture has been definitely recognized.

   b. Internal hemorrhage—remove to hospital
      (1) Remove patient to hospital immediately. Internal hemorrhage can be treated only on the operating table.
      (2) Keep patient warm, handle and lift him gently but rapidly.
      (3) In case of abdominal wounds, place patient on his back, with the abdominal wall relaxed by bending the knees over a box or rolled coat, and with the head and shoulders raised.
      (4) Do not attempt to replace any protruding organs, but protect them by covering with lint or a soft towel wrung out of hot water, if possible. Secure the lint or towel with clean, soft flannel, or similar material, firmly, but not too tightly.
      (5) Do not give patient *anything* to eat.

B. Burns and Scalds Should Be Treated At Once

1. *Burns and scalds differ*
    - a. A burn is caused by dry heat, such as a flame, hot metal, an electric current, or a strong acid or alkali.
    - b. A scald is caused by wet heat, such as steam, boiling water, or boiling oil.
2. *General rules for treatment apply to both burns and scalds*
    - a. Exclude air from the affected part immediately by immersing in water, preferably at body temperature, or by covering with clean cotton, wool, lint, or soft, clean cloths, and then bandaging. These are temporary measures to meet the situation until suitable dressings are prepared.
    - b. Keep patient warm and treat shock.
    - c. Use great care, if clothing must be removed. If it sticks, cut around the pieces which adhere to the flesh.
    - d. If blisters have formed, do not break or puncture them, but keep them intact.
    - e. Make suitable first aid dressings from strips of lint, or linen, about 2 inches wide, which have been:
        - (1) Soaked in warm strong tea and allowed to dry.
        - (2) Soaked in a lotion made by stirring baking soda in clean, warm water. In this case, the strips must be kept wet by repeated damping with the lotion. The strength of the lotion should be about 2 teaspoonfuls of soda to a pint of water, or
        - (3) Smeared with tannic acid jelly on the surface to be applied to the skin.
    - f. Cover the dressing with cotton, wool, or soft cloth, bandage lightly, and support the affected part.

LESSON III—FRACTURES, SPLINTS

A. Fractures May Be Simple or Compound

1. *Simple fracture*

    The bone is broken but there is no penetration of the surrounding flesh by the object which caused the fracture or by displacement of the jagged broken ends of the bone.
2. *Compound fracture*

    The bone is broken and in addition there is a wound from the break to the surface of the skin, thus potentially admitting dirt and causing infection.

B. Symptoms are Pain, Swelling

1. Pain at or near the point at which the bone is broken.
2. Loss of power of movement of the affected limb.
3. Swelling around the part affected.
4. Deformity, the limb falling into an unnatural position and having an abnormal shape. It may be shortened by overlapping of the fragments of the broken bone.

5. If the fracture is compound, there will be a visible wound, the bone may be exposed and visible, and the patient may be suffering severe shock.

C. FIRST AID TREATMENT PREVENTS FURTHER DAMAGE
  1. Treat the fracture where the patient lies, unless there is danger to life if he is not immediately removed. Injudicious movement may convert a simple fracture into a compound one.
  2. Control severe bleeding and treat shock, if necessary.
  3. Place the limb in as natural a position as possible with extreme care and no force. Do not attempt to set a bone. In the case of a compound fracture with a protruding fragment, do *not* attempt to replace it.
  4. If the case is urgent, or if there is no material for splinting, secure a fractured leg to the other one, or a fractured arm to the trunk, by careful bandaging.

D. APPLY A SPLINT IF PATIENT MUST BE MOVED
  1. Splints must be firm and long enough to keep the joints immediately above and below the fracture at rest. Bandages must be tight but not so tight as to interfere with circulation.
  2. Splints should be put on over the clothing and should be padded where there is risk of rubbing or where there would be gaps between the splint and the body.
  3. Splints may be improvised from such things as laths from venetian blinds, canes, pieces of wood or cardboard, rolled up linoleum or newspaper.

E. SPECIAL FRACTURES REQUIRE EXPERT ATTENTION

Fractures of the spine, pelvis, thigh, or skull should never be treated by anyone but an expert medical attendant. Civilian defense workers should summon such help and make the patient comfortable. Do not move him unless absolutely necessary.

LESSON IV—ARTIFICIAL RESPIRATION, SHOCK

A. USE PRONE PRESSURE METHOD OF ARTIFICIAL RESPIRATION
  1. Lay victim on his belly, one arm extended directly over head, other arm bent at elbow. Turn face toward extended arm, resting the head on hand and fingers of bent arm.
  2. Kneel straddling the victim's thighs, with your knees just above his knees.
  3. Lean forward and place the palms of your hands on the lower part of his chest with the little fingers resting over the lowest ribs. Your wrists should be about four inches apart.
  4. With your arms held *straight,* swing forward slowly, so that the weight of your body gradually bears on the victim. At the end of the forward swing your shoulders should be directly over the heels of your hands. This operation should take about two seconds.
  5. Quickly swing backward so as to remove pressure completely.
  6. After two seconds swing forward again. Repeat steps 4 and 5 regularly 12 to 15 times a minute until natural breathing is restored.

7. Loosen tight clothing about the victim's neck, chest, or wrist. Keep him warm.
8. Do not give him any liquids until he is completely conscious. Then give him hot tea or coffee.

B. MOST CASUALTIES SUFFER SHOCK

1. *Shock may be primary or secondary*
   Wound shock is a condition of failure of vitality always present to some degree in every case of injury. The effects vary from temporary faintness to extreme and dangerous prostration. In air raid cases shock is likely to be very marked. A casualty may rally from the primary condition immediately following the injury, but then lapse into a more serious and lasting condition of secondary shock which is dangerous to life.
2. *Symptoms are as follows:*
   a. Pallid face; lips, ears, finger nails often blue.
   b. Weary, lusterless, half closed eyes.
   c. Cold, clammy perspiration, especially on forehead.
   d. Weak but rapid pulse.
   e. Severe chill, body temperature falls rapidly.
   f. Nausea and vomiting frequent.
   g. Breathing may be irregular.
   h. Mental sluggishness or unconsciousness.
3. *Primary shock must be treated to prevent secondary shock*
   a. Keep the patient warm by wrapping him in blankets or coats, with at least one layer between him and the ground.
   b. Relieve pain by gentle adjustment of the patient's position or by suitable support to the injured part. Do not allow the patient to sit up.
   c. Stop bleeding and secure fractures before moving patient.
   d. Give patient warm, sweet drink, such as sweetened tea or coffee, but do not give food or drink if patient is unconscious or has abdominal wound. Do not give stimulants if the patient has a strong pulse or fractured skull.
   e. Place hot-water bottles between the body and outspread arms or across the upper part of both thighs where they can best warm the circulating blood. Wrap hot-water bottles in woolen or other material; never lay them directly on the bare skin.

LESSON V—WAR GASES

A. FIRST STEPS APPLY TO ALL GAS VICTIMS

1. Put a gas mask on the victim, if possible
2. Remove the victim from the contaminated atmosphere, or area, as soon as possible.
   a. If gas has been released in your immediate vicinity, move upwind, since gases travel downwind.
   b. If gas has been released upwind from you, move across the wind until you are out of the stream.

   c. Avoid low places or basements, since gas settles in hollows.
   d. Close doors and windows, and stuff all cracks and openings. If windows are blown out by explosions, hang wet blankets, and fasten them at the edges.

3. If case is serious, judging from violent effects or length of exposure, get the victim to a first aid post immediately.

B. Tear Gases or Eye Irritants

1. Generally, no treatment is necessary. Do not rub eyes or apply bandage to eyes.
2. In severe, lasting cases, irrigate the eyes with a solution containing 2 level teaspoonfuls of baking-soda in half pint of warm water.

C. Sneeze Gases or Nose Irritants

1. Flush nose and throat with weak solution of baking-soda (2 level teaspoonfuls to half pint of warm water), or
2. Breathe fumes of bleaching powder in a wide-mouth jar.
3. Reassure victims that symptoms are only temporary.

D. Choking or Lung Irritant Gases

1. Absolute rest for 48 hours is essential, even when no symptoms appear.
2. Keep victim lying down and transport on a stretcher. Do not allow him to walk.
3. Keep victim warm. Give him hot coffee or tea.
4. Do not give artificial respiration.
5. Do not permit victim to smoke.

E. Blister Gases

1. Act quickly. Degree of burning depends upon promptness of first aid.
2. Remove all contaminated clothing.
3. Irrigate victim's eyes with solution containing 2 level teaspoonfuls of baking-soda to a half pint of warm water.
4. Daub, don't rub, skin with cloths moistened in benzene, kerosene, alcohol or ether, or with straight gasoline. Wash off with running water and soap.
5. Before the skin becomes red, neutralize the gas by applying bleaching powder (chlorinated lime) made into a cream paste with water.

F. Incendiaries (Phosphorus)

1. Remove all particles. Immerse the wound in hot water, thus melting the phosphorus, and wipe out with a gauze pad. If necessary, squeeze particles out. If cold water is used, particles must be picked out under water. Or
2. Apply copper sulphate solution (2 to 5 per cent). This coats the phosphorus with copper and stops the burning. The particles can then be lifted out. Then, treat the victim as for an ordinary burn.

References:

First Aid Text-book, American Red Cross, 1940.

Handbook of First Aid, OCD, 1941.